THE NEWSWEEKLY FOR THE COMPUTER COMMUNITY

COMPUTERWORLD

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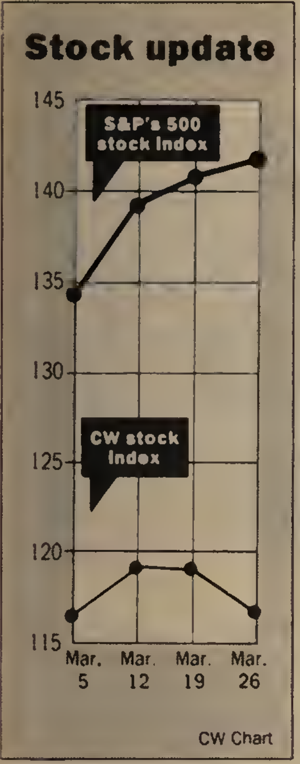
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A last-minute -financial review pulls the plug on the 3Com merger with Convergent Technologies. **Page 110.**

■

Software maintenance at federal agencies suffers from problems similar to those found in the private sector, but change is under way. **Page 29.**

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A micro data base package coming in May from Alpha Software Corp. is expected to give users a new option to Ashton-Tate's Dbase III. **Page 33.**

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Burroughs rolls out an entry-level model of its V series mainframes and a new operating system. **Page 10.**

■

OAC quietly expires in Houston. **Page 14.** Meanwhile, in Las Vegas, Pick system devotees ponder legal and standards issues. **Page 12.**

■

If you listen to the analysts, IBM is going to be busy April 2. That's the day — April Fools' Day has apparently disrupted the company's normal Tuesday announcement procedure — IBM is expected to announce a 20M-byte hard-disk option for the Personal Computer XT, price cuts on the PC XT of 17% to 26% and cuts on the PC AT as high as 22%. But why stop there? Other possibilities are a new version of Topview that can access all PC-DOS functions, a 2M-byte random-access memory extender for PCs, a new PC AT running at 8 MHz with plug-in RAM allowing 640K bytes on the motherboard and the ever-possible laptop.

■

Apple Computer is entering final negotiations with 3Com about plans to produce a Macintosh file server, sources said. The product, which is not expected to be released until July, will be manufactured by 3Com and sold to Apple for distribution.

■

Quotron Systems, Inc. Chairman and Chief Executive Officer Milton E. Mohr said last week that his board felt Citi-

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IBM markets Answer/DB micro link

By Charles Babcock

NEW YORK — IBM has brought under its product umbrella an outside firm's micro-to-mainframe link that provides end-user access to IBM's leading mainframe data bases. The product, Answer/DB for Personal Computer Products, will be available from IBM beginning April 18.

Answer/DB offers IMS, VSAM and DL/1 data to users of microcomputer applications from Ashton-Tate and Lotus Development Corp. Answer/DB was developed by Informatics General Corp., now the Answer Systems Division of Sterling Software, Inc. of Canoga Park, Calif.

Answer/DB will also access Cullinet Software, Inc.'s IDMS and Software AG of

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Data match hits welfare fraud

By Mitch Betts

WASHINGTON, D.C. — This fall the Internal Revenue Service will launch a computer matching program in cooperation with state and local officials in an effort to identify welfare cheats. Experts describe the effort, undertaken at congressional directive, as the broadest use of IRS data for nontax purposes ever ordered by the U.S. government.

The Income and Eligibility Verification System, mandated by the Deficit Reduction Act of 1984, is aimed at identifying applicants and recipients of federal aid programs who earn interest or dividend income that would make them legally ineligi-

See **DATA** page 6

Net options drive show

Managers at Interface find non-AT&T choices

By Elisabeth Horwitt

ATLANTA — As vendors jostled each other to announce the latest connectivity device, system and/or scheme, last week's Interface '86 communications trade show turned into a battleground for more than 300 exhibitors and into a postdivestiture shoppers' paradise for telecommunications managers.

Typical was the comment of Douglas Barteau, communications manager for Guarantee Financial Corporation of California in Fresno: "I'm old enough to remember a time when Ma Bell was the only game in town when it came to networking equipment. You had limited technology, controlled by one vendor. Now there are 49 suppliers of T1 multiplexers in the U.S. alone."

See **MANAGERS** page 8

T1 market opens up

ATLANTA — Seeking to exploit a trend among large users to justify T1 network links on the basis of voice traffic demands, a surprising number of communications vendors at Interface '86 last week announced T1 products that link up with most types of digital private branch exchanges as well as with AT&T Communications services.

Telecommunications managers interviewed at Interface confirmed vendors' perceptions of a burgeoning demand for effective voice/data integration over T1 lines.

"We're looking for someone with a modulation technique to transmit data over voice on T1 lines and still maintain circuit integrity," said David Kornreich, second

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CW EXCLUSIVE

Stellar performance: Real-time analysis has Halley's by the tail

By Eddy Goldberg

The National Aeronautics and Space Administration budget cutbacks that greatly reduced U.S. participation in the Halley's Comet Flyby earlier this month were only another challenge to scientists at the Southwest Research Institute in San Antonio.

The scientists responded by devising a real-time data collection and analysis system that was the only Flyby experiment to produce graphics within seconds of receipt of the data by the sponsoring European Space Agency.

The real-time system was a component of the Johnstone Plasma Analyzer, one of 10 separate on-board experiments carried by the Flyby satellite *Giotto*. All of the experiments were designed to help determine the chemical composition of Halley's comet; the JPA experiment was designed to focus on the composition of particles in the comet's tail and how they mix to produce the tail.

In their initial proposal to NASA, Southwest Research Institute scientists had not planned on creating a real-time system for the JPA. However, said David Winningham, who headed the institute team, the switch to real-time was made because of the once-in-a-lifetime nature of the celestial event and his team's desire to broadcast data from *Giotto* to scientists and the public as soon as possible.

Giotto's real-time system was built around a dual-processor Masscomp 5500 32-bit supermicro running under a Unix virtual memory operating system. Each processor included a Motorola, Inc. 68010-based CPU, with 2M bytes of memory and a floating-point accelerator. Winningham's team constructed the system in just six months, drawing upon hardware and software configurations they had used in previous

See **REAL-TIME** page 4

NEWSPAPER

IBM puts PCs and terminals under same discount structure

By Douglas Barney

IBM has changed its volume purchase program to allow IBM Personal Computers and terminals to be purchased under one discount structure.

"Because big customers use PCs as workstations anyway, we put them both in one volume procurement agreement," said IBM spokesman Paul Neuman. Under the plan, IBM Personal Computers, mainframe interactive displays and ASCII displays are all part of the same category.

"When you buy a large volume of PCs in conjunction with a large volume of the display stations, the price you are paying for the PCs is probably a little lower than the discount would indicate because you are paying an aggregate price," Neuman said. IBM also increased the discount from 24% to 27% on purchases of from 250 to 499 Personal Computers.

"The more things you can lump together, the higher discounts you can get," noted Robert Antall, vice-president of MIS for Child World, Inc. in Avon, Mass.

Larger users, however, see less impact. " We have a special bid, which gives us substantially more discounts than the published schedule," said Arun Maheshwari, vice-president of the systems division for New York-based Continental.

Customers who currently have volume purchase agreements can request a transition to the new agreement by notifying IBM in writing before April 30, 1986. However, customers with current IBM microcomputer volume purchase agreements who desire a new contract must commit to at least the same quantity of machines as called for in the previous contract.

IBM markets Answer/DB link

From page 1

North America, Inc.'s Adabas, "which is an example of IBM turning the tables on the independent software companies," said Ted Jastrzembski, senior consultant with the software research program at International Data Corp. (IDC). During the last several years, the independents have been successfully selling their data base management systems into IBM installations.

Jastrzembski also speculated IBM will link Answer/DB to its DB2 data base. "This would be an interesting way for them to put an umbrella over both the IMS and DB2 environments," he said. A Sterling executive would not rule out such a move but said that the action has not been discussed with IBM at this point.

IBM is marketing a link from an independent supplier because "none of IBM's links have done a particularly good job of getting people to use them," said market analyst Frank Gens, an IBM watcher also working for Framingham, Mass.-based IDC.

"IBM is not going to endorse another vendor's product unless it absolutely has to," said Steven Pfrenzinger, president of IMS Consulting in North Ridge, Calif. He added that IBM may endorse additional productivity packages from other vendors. "IBM wants to protect its DBMS products, and any independent vendor that provides a tool to interface with those products is something that IBM is interested in," he added.

Pfrenzinger said the agreement is "a shot in the arm" for Sterling at a time when the line that once sold under the Informatics name is aging. "Answer/DB is one of the few bright spots in the [Sterling] product line," he said.

Beginning April 18, IBM will offer Answer/DB for $20,000 to DOS operating system users and $35,000 to OS system users. Answer/DB versions run as an application under CICS or IMS/VS and require one of two micro packages: Lotus/Answer or Dbase/Answer. IBM will market the mainframe software under its own label, and the micro software, which sells for $550 per package, under the Sterling label.

According to one experienced Answer/DB user, Carl F. Rahmqvist, manager of support systems for Transamerica Corp. in Los Angeles, the product is "a time-saving piece of software" and IBM's decision to market the Answer line "brings a kind of approval to my decision making."

Transamerica has used Answer/DB and related micro packages for approximately 18 months, Rahmqvist said.

"Before, marketing managers would take a computer-generated report and rekey the information into 1-2-3. It was very time consuming and error prone," Rahmqvist said.

With the link, requests for data are made through the micro packages and accesses the mainframe via IBM 3270 terminal emulation, where it is executed by Answer/DB, according to IBM. The data is placed in a communications file and, upon user request, sent to a microcomputer where it can be entered into Dbase II, III or Ashton-Tate Framework, using Dbase/Answer, or into 1-2-3 and Symphony, using Lotus/Answer.

Access to mainframe data can be limited at the level of data base, record, segment, field or field value, according to IBM. The built-in security is intended to allow "the data processing department to maintain control of mainframe resources," IBM spokesmen said.

Sterling officials said the firm is developing Answer/DB links to other micro packages, but they would not comment on specific products.

Sterling will continue to sell the products, with pricing "in the same range" as IBM's, according to Sterling Vice-President Richard H. Hannes.

Sterling will provide support to all Answer customers, regardless of which company makes the sale, and the company will increase its support staff in anticipation of increased sales as a result of IBM's endorsement.

West Coast correspondent Maura McEnaney contributed to this report.

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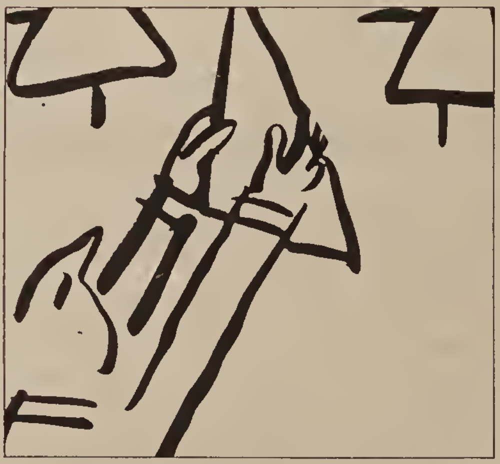

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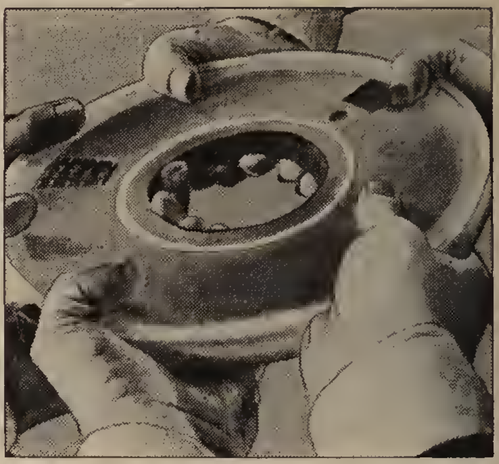

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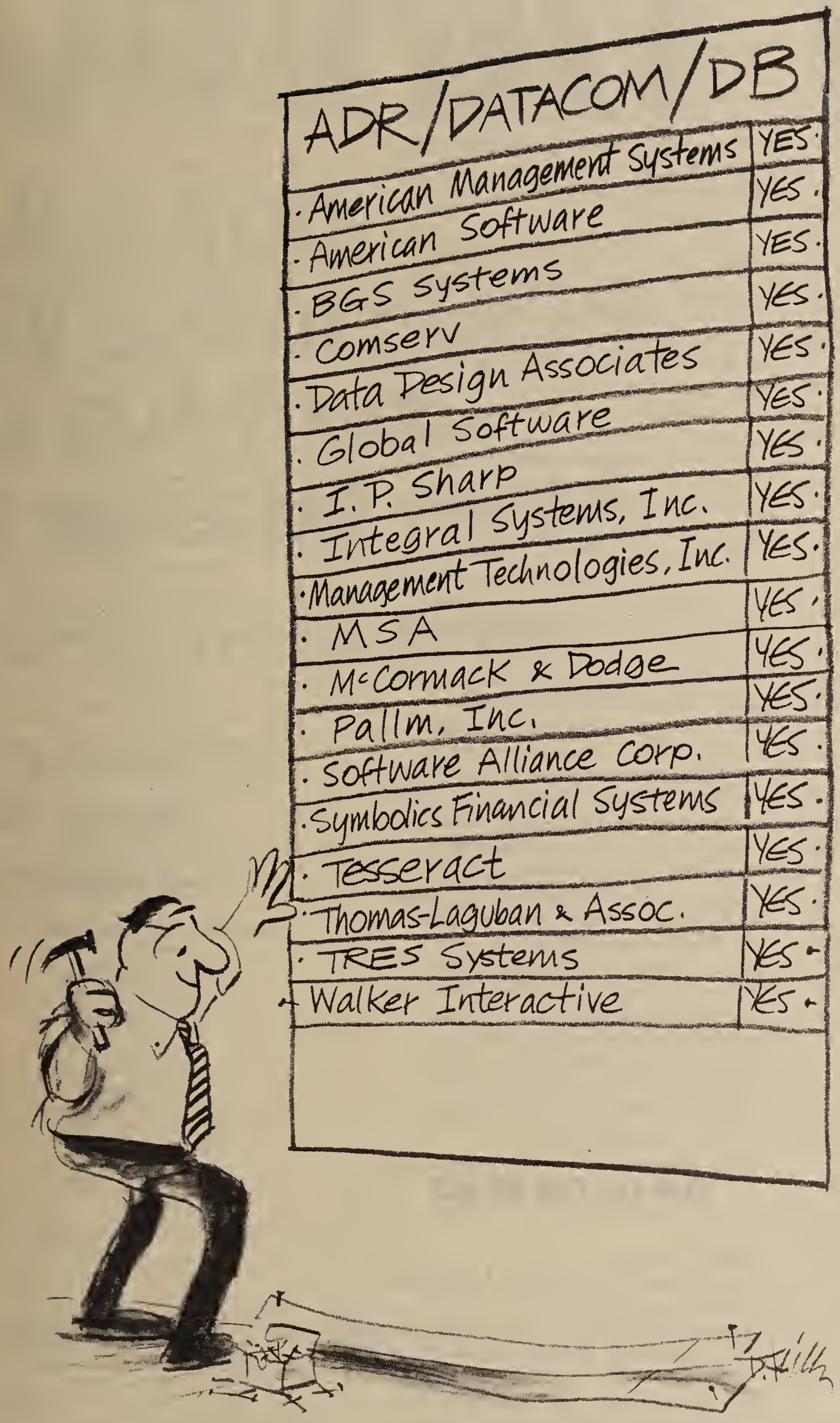
WE'RE JUST A DATA BASE THAT CAN'T SAY NO.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Borland offers discount plan to big buyers

By Douglas Barney

SCOTTS VALLEY, Calif. — Borland International last week introduced a volume purchase plan, the Corporate Standardization Program, which provides discounts up to 55%.

"It is essentially a volume purchase plan done in response to customer requests over the past year," said Robin Tygh Shephard, a Borland spokeswoman.

Borland originally introduced a site license program in September that provided duplication rights to Borland products, but the program attracted too few customers. "Site licensing as we know it wasn't meeting the needs of corporate customers," Shephard said. Borland's site license program, however, has not been canceled.

Unlike many site license programs, Borland's Corporate Standardization Program is not site based. Instead, companywide purchases of Borland products accumulate and make the company eligible for larger discounts. For example, if a company accumulates purchases of $500 worth of any Borland products, that company is eligible for a 35% discount. Once a firm has accumulated purchases of $75,000, it is eligible for 55% discounts. Customers with purchases of more than $75,000 qualify for Borland's site license program. Borland is also making discounts available on product upgrades, but Shephard declined to give details of the upgrade plan.

In other news, Borland will announce Word Wizard, a $49.95 set of four word games, in San Francisco this week. More important than the games, however, is the commented source code available with them.

The commented source code will assist software developers in writing hooks into Borland's Turbo Lightning product, which will be positioned as a data acquisition front end to large data bases on microcomputers and compact disks. "It gives an inside peek into how Turbo Lightning works," Shephard said, but declined to give further details of the product.

Real-time system analyzes Halley's

From page 1

NASA projects.

One processor was dedicated to receiving, reformatting and writing data to disk to assure that data was collected accurately, Winningham said. "The data was transmitted only once," he said. "We had to catch it. Using two processors allowed us to make sure data coming in was not interrupted or swapped out by any of the processors. You can't tell a satellite to hold on for a moment."

The second processor took the file from the disk and performed intensive high-speed computations to produce mass spectrograms and a three-dimensional matrix indicating the number of particles coming off the comet in a particular energy range, their angle and their mass range. The total time from receipt of data to graphic printout was four seconds.

All the data collected by the JPA and other instruments aboard *Giotto* was gathered in the satellite's central processor and relayed to earth in real-time at 40K byte/sec. via radio transmitter, where it was received by tracking stations in Australia, the Azores and the U.S. and retransmitted to mission control headquarters in Darmstadt, West Germany, via leased dedicated lines.

The JPA was developed at the Mullard Space Science Laboratory of University College in London by a research team headed by Alan Johnstone. The instrument consists of two sensors — one a fast ion sensor, the other an implanted ion sensor.

During the four-hour flyby, half the instrumentation was lost, Winningham said, because of gas and dust particles hitting the satellite despite its protective shield.

"At 70 kilometers a second, a speck of dust is like a howitzer shell," Winningham said. However, Winningham said fewer problems occurred than anticipated, and much of the equipment survived undamaged. The ESA is looking at ways to bring *Giotto* back to earth in the next three to four years, he added, to study the composition of the cometary particles that were embedded, vaporized or melted onto it.

Winningham said Johnstone contacted him because the community of scientists doing work in plasma physics is relatively small. "Those measuring the ionic component are smaller still," Winnngham explained.

A group of scientists at the Max Planck Institute in West Germany selected the Los Alamos team for the project. This team and two groups of UK scientists were involved in the JPA experiment.

Winningham said his team was concerned about being able to pull off all that the teams from the UK, Sweden, West Germany and Italy wanted. During the last two weeks before shipping the real-time system to Darmstadt, last-minute programs were added to perform further experimentation.

Three levels of goals were set. The first level was a minimum set of goals that consisted of mostly an I/O type of operation to capture the data and present it on a high-resolution graphics monitor. Second- and third-level goals consisted of more refined computational operations or "real scientific analysis doing fairly intensive floating-point calculations," Winningham said. He said many of the second- and third-priority goals were achieved.

Winningham cited a number of reasons for choosing the Masscomp-Unix system. The team had used Masscomp equipment previously on NASA projects and had developed data reduction and presentation software. "We wanted it to be portable and microprocessor based, so that each mission would only require small changes. As a scientific manager, I prefer Unix because it frees me from being tied to any one hardware manufacturer. I can choose hardware based on the available funds."

Much of the software was written on AT&T 7300s and transferred to the Masscomp machine. The software developed and tested in San Antonio was shipped to Darmstadt in December. It arrived on a Friday, came out of customs Monday and Winningham's team had it up and running by Wednesday. They went back two weeks before the mission for final preparations.

TOP OF THE NEWS

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corp's takeover offer of $19 per share was "not adequate." The response potentially set the stage for an attempted hostile takeover of the on-line financial data service by the nation's largest commercial bank. Mohr said Quotron would consider "developing relationships with others with a view to maximizing shareholders' value," leaving the door open for a "white knight" partner to repel Citicorp's efforts.

■

IBM could announce a 4381-on-a-chip machine in about a year, analyst Ulric Weil of the Gartner Group told a conference recently. But even such a product will not give IBM enough total sales in 1987 to reach its average annual growth goals of 15%, he predicted.

■

Asked whether AT&T Mail might interconnect with other private electronic mail providers such as DEC and Wang Laboratories, AT&T President James Olson last week said that AT&T Mail is "not intended to be a gateway to other systems."

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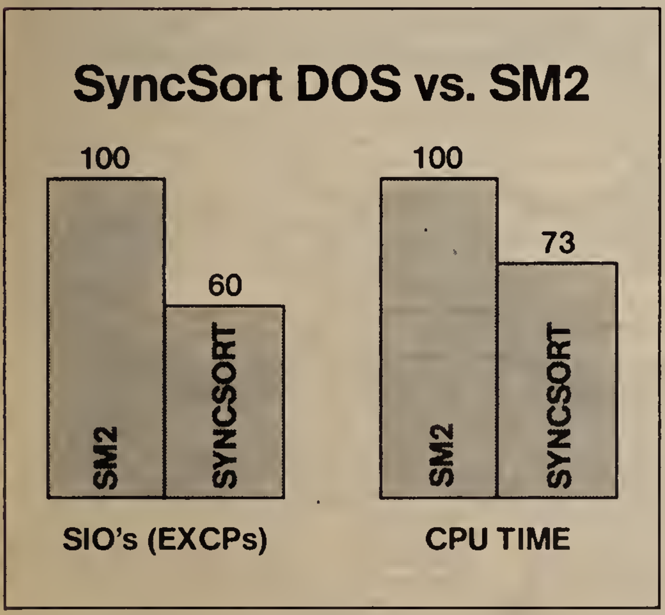

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Lotus introduces add-in tools

Conference promotes corporate user services

By Eric Bender

CAMBRIDGE, Mass. — New assembly language add-in tools for its microcomputer spreadsheet packages and promises of greater attention to corporate customers highlighted Lotus Development Corp.'s first developers conference held last week.

Lotus will offer "a second release of add-in tools for Symphony which offer major advances in functionality and features, and for the first time, we are going to add some equivalent tools for 1-2-3," Lotus Chairman Mitchell Kapor said.

Available by the fourth quarter, the tools will cost $150 and offer enhanced event management, memory management and system information features, according to Lotus officials.

Corporate users were predominant among the 460 attendees, but there was also a strong contingent of third-party developers that tailor products to 1-2-3 or Lotus Symphony.

While Lotus has been promising to address directly local-area network issues in a series of statements dating back to 1984, Kapor said work on the issues "should bear fruit in the near-term time frame."

R. Gregory Lazar, director of field support, said that Lotus' 1986 plans include more customized training at field sites, a more formalized MIS advisory group and "new and varied support offerings."

Lazar remarked that "we currently support 250 different users groups, 88 of which are in corporations." He estimated that the company's field support staff spends four-fifths of its time working with corporate customers.

While Lotus is frequently asked about plans for a 1-2-3 derivative with a graphical user interface, "the mainstream of development for the present and into the future emphasizes 1-2-3 as a character-based product," Kapor said.

Among definite development plans for its star product, Lotus is working on "intelligent interfaces" like the Human Access Language program acquired with GNP Development Corp. In addition to handling English commands, HAL has built-in knowledge about 1-2-3, Kapor said.

Kapor also listed several research efforts. These efforts include work to boost the speed of recalculation by using new design concepts, to provide higher levels of programming structure, to integrate expert systems technology and to exploit decision support systems techniques.

While Lotus has a large number of works in progress, many new products will require a much more powerful system environment, with Intel Corp. 80386-based hardware and advanced versions of Microsoft Corp.'s MS-DOS, Kapor emphasized.

Effect to be felt in 1987 and beyond

"The effect of all this great new stuff is not going to be felt in 1986 but in 1987 and beyond," he said.

Among other product development efforts, the Engineering and Scientific Products Division will introduce at least two products this year, targeted toward the IBM Personal Computer AT, according to Lotus officials.

Within the Information Systems Division, the Information Center group is revising the recently acquired Ilink micro-to-mainframe data access software and will release an updated version in the second half of 1986, said group manager Alexander Crosett.

Also within that division, a new electronic mail group plans to bring a product to market by year's end, according to Don McLagan, Information Systems Division vice-president.

System problems plague N.J. Human Services' computer

By Charles Babcock

TRENTON, N.J. — Data entry and reconciliation problems are plaguing New Jersey's Department of Human Services as it attempts to implement a new financial management system, state officials said.

According to James J. Dolan, the state legislature's chief auditor, the 15-month-old system was developed internally with help from a consultant, the accounting firm of Peat, Marwick, Mitchell & Co. Dolan said the consultant in particular was expected to handle the interface between the state Treasury Department, with its IBM mainframes, and the Human Services Department system, dubbed Alstars.

Alstars, which was designed to run on a Honeywell, Inc. processor, was designed to track the flow of state and federal money into the veterans, social services and other Human Services programs where a mix of national and local money is used. "The state's treasury system could not do this. The intent was to furnish detail not available under the Treasury Department's system," Dolan said.

'A huge reconciliation problem'

In early 1985, however, errors were repeatedly discovered in the data being entered into the Alstars system. Dolan declined to pinpoint the source of the errors, but he said they were related to the system's operation. Related data was being entered into the Treasury Department's system but at different times, and the state was confronted with "a huge reconciliation problem," Dolan recounted.

In a report to the legislature Budget and Finance Officer, Dolan stated: "Due to the continuation of large error listings and reconciliation problems, the [Human Services] Department directed all its divisions to discontinue data entry on August 30."

On individual features of the system, Dolan reported the following:

- Obligation accounting. "This system is not fully operational because it requires direct data entry, which has been suspended since last August."
- Spending plan. The "system is operational. However, it is used only on a limited basis because this feature requires each division to identify the spending plan level and amount of funds to be assigned to each level." Since some of the information is not available, use of the feature is optional, Dolan wrote.
- Budget plan. "It is not in operation and will require additional programming changes before it can be put into operation."
- Cost accounting. "It is in operation. However, some problems exist and the information is currently not being used to generate federal reports as it was supposed to."
- Nonappropriation funds. "This system is reported to be available. However, no data has been entered and presently no time frame has been set for instituting operation of the system."

Dolan said the system was envisioned as being fully operational nine months after implementation, a schedule he termed "optimistic."

Peat Marwick "did everything required of them," Dolan said. Many of the problems were the result of the parts of the system that were developed internally. Peat Marwick will receive $1.5 million for its share of the $5.2 million system.

The state Appropriations Committee will review how New Jersey is spending its money on computers during the budget process this year, the spokesman said.

Data match in welfare fraud

From page 1

ble for such aid. Verification will be made through the IRS master file on unearned income, thus representing the first time the data base has been tapped for this purpose, according to government officials and a recent announcement by three federal entitlement agencies covered by the system.

The data match could save as much as $70 million a year from the $39 billion Medicaid program alone, the agencies claimed, but privacy advocates and tax officials express concern at the Big Brother implications of the program.

"While we have to be concerned about fraud and waste in government programs, I have concerns that the privacy of citizens may be shortchanged as we release more tax information to state agencies," Sen. William S. Cohen (R-Maine) said in a statement.

The IRS has reservations about the program because it fears news of the computer matching program will discourage taxpayers from reporting all of their income.

"We have some philosophical concerns about it," IRS spokesman Steven Pyrek said last week. "It's the law, and we're doing it. We've tried to make it clear that . . . we have nothing to do with the program other than simply matching the computer tapes," he said.

Under the verification program, state officials will make a tape of the names and Social Security numbers of welfare applicants and mail it to the IRS.

The IRS will conduct a monthly match of each state's tape against its master file on interest and dividend income and send the tapes back showing "raw hits" of income exceeding the limits for the welfare programs.

The computer matching system covers Medicaid, Aid to Families with Dependent Children and food stamps programs. It also requires state unemployment offices to use wage records to help identify people who collected unemployment benefits while employed.

The Reagan administration, with congressional support, has vigorously pursued computer matching programs — in which one government data base is cross-checked with another — in an effort to curb fraud and abuse in government financial aid programs.

But the American Civil Liberties Union (ACLU) and other privacy advocates are concerned that the program erodes the principle of confidentiality for personal tax information.

Robert Ellis Smith, publisher of the "Privacy Journal" newsletter, said that computer matching is an unconstitutional "fishing expedition" in which many innocent people are investigated without specific evidence that any particular individual committed a crime.

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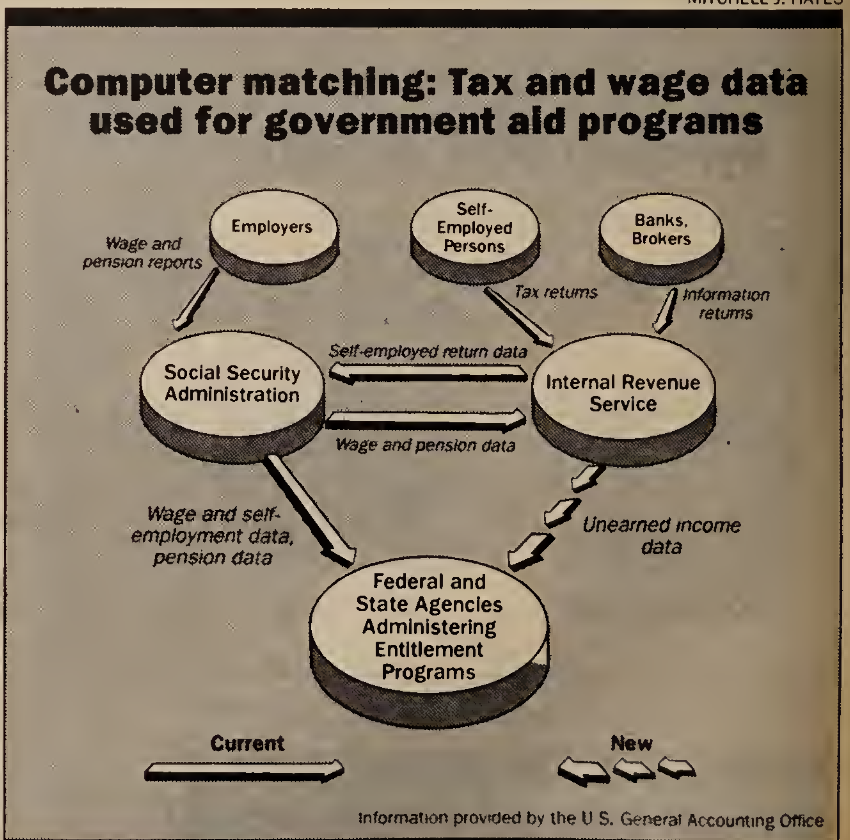

Computer matching: Tax and wage data used for government aid programs

Information provided by the U S. General Accounting Office

A paper by Jerry J. Berman, director of the ACLU's privacy and technology project, observed that while it is unrealistic to fight all computer matching programs, it might be wise to protect certain data bases — such as tax information and political beliefs — from computer matching.

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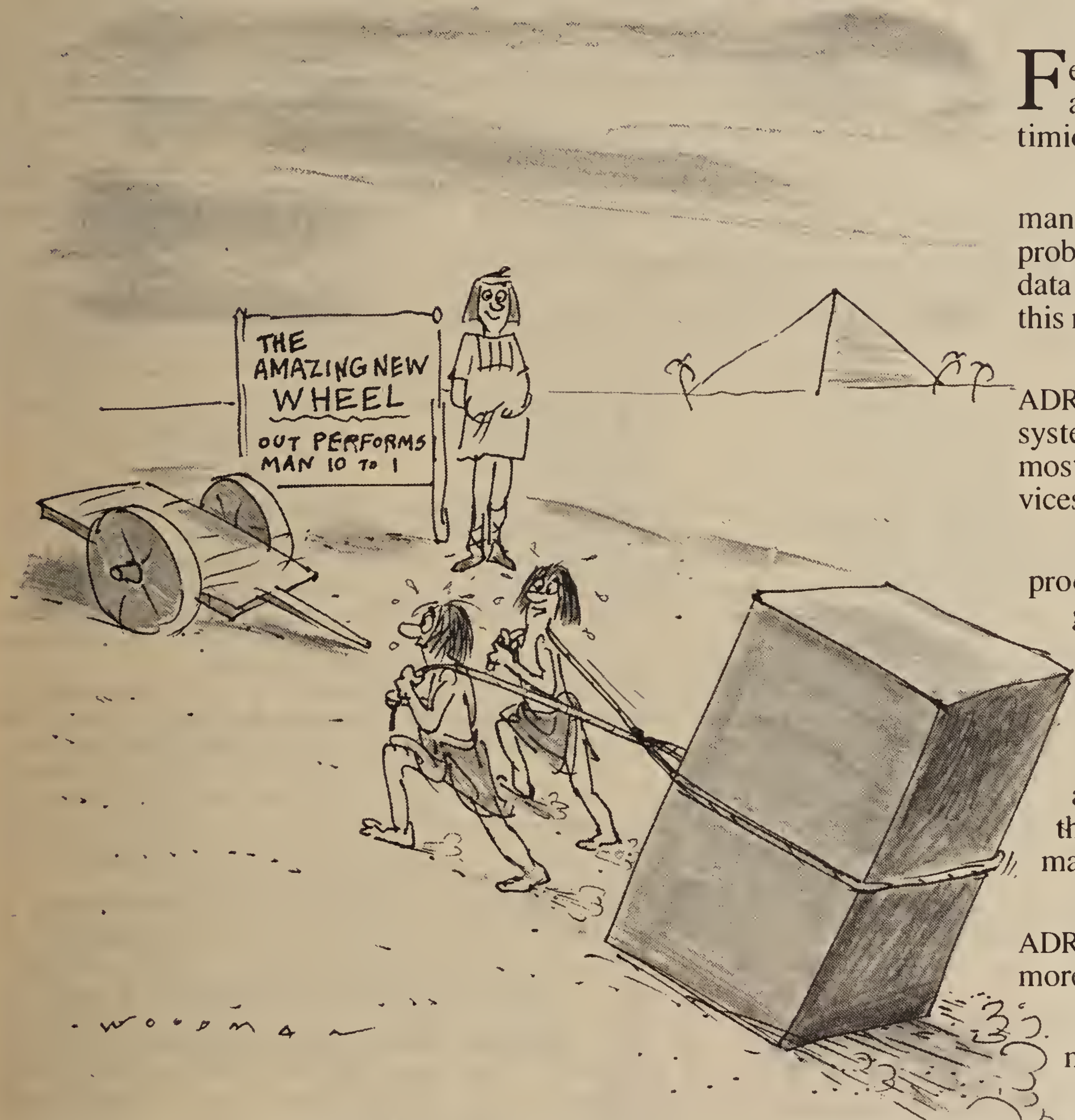

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Managers find network options

From page 1

Barteau was one of an estimated 15,000 attendees browsing through a smorgasbord of new products.

Many Interface attendees found that the familiar, traditional offerings did not always constitute the best choice.

"I thought I had already made a valid decision on a network application," said Guarantee Financial's Barteau. "But at this show I learned for the first time that I can go with a second vendor and conservatively save my company $125,000 over the original arrangement plus long-term cost savings from not having to backtrack from that direction."

Much of the Interface action occurred among the dozen T1 vendors that introduced products in the areas of network management, compatibility with digital private branch exchanges and AT&T voice services and switches that can handle a greater number of T1 lines (see story below).

Such offerings address the growing host of businesses that want to cut at least a few of AT&T's apron strings and take control of a major portion of its network facilities.

AT&T, long accustomed to a captive audience for its services and products, responded to the growing independence of its customers by promising multivendor connectivity and greater control of its services through Integrated Services Digital Network (ISDN) offerings to come. "ISDN Services — here and now," was the theme of AT&T president James Olson's Interface keynote address.

'Fully committed to ISDN'

"For our part, let me say that AT&T is fully committed to ISDN," Olson said. During the show, the company announced its commitment to implementing by early 1987 the ISDN Primary Rate interface "that ultimately will allow business customers to choose from the full range of AT&T long-distance services on a call-by-call basis."

But a number of users and industry analysts claimed that AT&T's current service offerings do not give customers the same flexibility and control of networking facilities that can be provided by an in-house network management system.

Dixon Doll, chairman of Ann Arbor, Mich., consulting company, DMW Group, Inc., said, "AT&T favors Digital Access and Cross Connect, a network service that performs routing at the 64K bit/sec. DS0 level but which retains functionality at AT&T central offices. The problem with Digital Access and Cross Connect is that it makes it hard to partition channels below the 64K level."

Finds fault with CCR

Doll also found fault with another AT&T software-defined network service, Customer Controlled Reconfiguration (CCR), which enables the user to specify how T1 links are subdivided into DS0 channels at AT&T central office facilities and then routed to various destinations. "CCR does not give the customer the real-time control and reallocation of channels as he could get with in-house equipment," Doll said.

At an Interface seminar held on Wednesday, Robert Niebank, Merrill Lynch, Pierce Fenner and Smith, Inc. director of telecommunications, called his company's decision to become the first commercial CCR user a costly mistake.

Merrill Lynch used CCR in conjunction with its Mernet II, a network of multiple T1 lines linking the company's sites in six major U.S. cities, as well as in London and Bern. Niebank said that the network would be "in the black by the end of 1986." But he added that "it would have gotten there a lot sooner" if Merrill Lynch had not gone with CCR.

"We thought we could use CCR to reallocate T1 channels to balance traffic loads during the day. As it turned out, the service is so cumbersome that we only use it to redirect traffic when we have an actual outage," Niebank said.

While telecommunications managers at Interface showed no signs of ignoring AT&T's booth, they appeared to have no qualms about turning elsewhere for the functionality that AT&T has so far been unable — or unwilling — to provide. As a result, T1 exhibitors did a lively business. "This year we're getting qualified buyers who will make a definite decision in a month or two; last year we got more people who just collect literature," said Codex Corp. regional district manager Larry Wallace. "And T1 products are high on many people's lists."

At this third postdivestiture Interface show, there were clear signs that the telecommunications industry is finally becoming an open market and that business buyers are beginning to take advantage of the fact.

T1 market opens up at Interface '86

From page 1

vice-president and manager of network support at Chase Manhattan Bank. "We are in a commercial environment, so we can't afford a deteriorated mode during peak traffic periods. Our customers complain."

"Let's face it, 80% of most companies' communications bill is voice," observed George Kushin, vice-president of Avanti Communications Corp., one of the T1 vendors making a product introduction at Interface. "They're telling us they only use half of a T1 link for data, and the other half they want to use for an AT&T voice service."

The T1 products introduced at Interface promise to offer users more flexibility in configuring their own internal telecommunications systems and easier, more cost-effective access to AT&T offerings.

The T1 products conform to D4 framing specifications used by Digital Access and Cross Connect (DACS), a central office facility that allows users to tie into AT&T services that manage, monitor and route voice and data transmissions over distance.

The rash of DACS-compatible products is resulting from heightened vendor awareness that "despite all the yack about data traffic increasing, when a company needs to justify a T1 network, it uses voice," said Joaquin Gonzales, an analyst at Stamford, Conn., research company the Gartner Group, Inc. "What people want is the ability to split up bandwidth at the point where a T1 terminates on site and divert some channels to WATS, some to 56K, some across country and some to premise systems."

DACS is the system AT&T uses to divide T1 links into 64K bit/sec. channels, and it also serves as customers' gateway to AT&T services. Two such services, M24 and M44, take customers' 1.54M bit/sec. T1 transmissions and subdivide them into 24 or 44 DS0 channels, each carrying 64K bit/sec. Another AT&T service, Accunet 1.5, carries customer transmissions at speeds up to 1.5M bit/sec.

Through AT&T's Customer Controlled Reconfiguration (CCR) service, a tariff offering, corporate customers can determine the destination of DS0 channels going out of an AT&T central office.

Products announced last week would allow users to use DACS to link up with AT&T services or become their own telephone companies, using more powerful switching systems that can handle as many as 128 T1 links. Or, the products would allow users to devise hybrid solutions.

> ***'Despite all the yack about data traffic increasing, when a company needs to justify a T1 network, it uses voice.'***
>
> — Joaquin Gonzales
> Gartner Group, Inc.

Robert Niebank, director of telecommunications for Merrill Lynch, Pierce, Fenner and Smith, Inc. described his company's use of a wide variety of voice and data transmission technologies at a well-attended Interface seminar. "We use the telcos, leased lines, T1, public dial-up: Whatever is the cheapest way to go. You have to be a smart shopper," Niebank said.

Crucial transactions

Merrill Lynch typically uses T1 links to carry crucial transactions among branch offices across the country and to customer sites. Excess channel capacity is used to carry voice, Niebank said. When data traffic overloads current T1 capacity, "we just throw some of the voice traffic onto dial-up," he added.

Although Merrill Lynch was the first commercial customer for AT&T's CCR, the service was found to be unable to keep up with the rapidly changing traffic patterns of the brokerage giant's multisite T1 network.

AT&T refuses to offer a customer premises DACS system because it prefers that user companies utilize its tariff offering CCR, according to Gartner's Gonzales.

Not only is CCR a profit source, Gonzales said, but it also is part of AT&T's campaign to discourage customers from establishing their own telephone systems. "With CCR you pay, and you stay tied to AT&T," he noted.

The following are among the products announced last week:

- Avanti Communications Corp. introduced Special Access Management System (SAMS), "The next layer of AT&T compatibility" on the vendor's T1 multiplexer, Ultramux. SAMS permits Ultramux T1 networks to link up with D4-compatible digital private branch exchanges (PBX) and with the full range of AT&T service offerings.

SAMS will be shipped in August. Pricing was unavailable.

Another Avanti announcement, Accupac-1.5, is a T1 format processor that provides a direct link between high-speed data terminals and Accunet 1.5. The product is available now and is priced at $3,995 for a single-port unit.

- Infotron Systems Corp. announced the Infostream 2500 T1 hub, a DACS-compatible networking system capable of supporting up to 12 T1 interfaces. "With the 2500 you can upgrade from our 1500 point-to-point T1 systems to a hub that handles communications among all sites," said Infotron product line manager Joseph Bulsak.

The 2500 is priced at $55,000 to $70,000 per node for a fully redundant system and will be available in September or October.

- Timeplex, Inc. introduced Digital Access Exchange (DAX), a DACS D4-compatible T1 switch that cross-connects 64K bit/sec. DS0 channels on up to 128 1.54M bit/sec. T1 links, Timeplex spokesman William Flanagan said. DAX will be available in the fourth quarter of 1986.

Timeplex also announced Link/2 Voice/Data Network Exchange, a DACS-compatible network management system that has all the capabilities of the vendor's older Link/1 product, plus connections to digitized voice systems, Flanagan said. Available in October, Link/2 models start at $15,000.

Minilink, another new product from Timeplex, is an entry-level, preconfigured network management system starting at $9,000.

- International Data Sciences, Inc. (IDS) announced its first DACS-compatible product, the Magnumux T1 multiplexer. According to company spokesman Ron Wiggins, Magnumux can reroute DS0 channels among four or five T1 links. Available by midsummer, the Magnumux is priced at $1,400 per channel.

IDS also announced Maestro integrated network control system, IBM Personal Computer AT software that provides network monitoring, remote configuration and real-time alarm surveillance. The product will ship in May; pricing was not available.

- Network Equipment Technologies Co. chose the week before Interface to unveil Integrated Digital Network Exchange (IDNX) Series 40, a lower end version of its IDNX transmission manager.

IDNX/40, without redundant equipment, is priced at approximately $24,000. It will be available in third-quarter 1986.

— Elisabeth Horwitt

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   - 31. Manager/Supervisor Programming
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Burroughs introduces entry-level mainframe for V series

Designed operating system exclusively for new series

By James Connolly

DETROIT — Continuing a recent string of product introductions, Burroughs Corp. last week announced an entry-level system for its V series of intermediate mainframes and an operating system designed exclusively for that series.

The company, which in previous weeks announced a large-scale A series mainframe and several mainframe and microcomputer communications products, said the two V 310 models will fit below the V 340 and V 380 mainframes in performance and can be field-upgraded to those systems announced a year ago.

Analyst Steven Milunovich of First Boston Co. speculated, "Burroughs really has done a good job of getting products out to their customer base in recent years. Maybe they think the market is weak, and they figure that they can force the customers to start buying."

'Well positioned'

Milunovich added that the recent announcements and those of the past year leave Burroughs "well positioned to meet the customer demand when the market picks up later this year."

Yankee Group analyst Thomas Henkel noted that the string of Burroughs announcements is not unexpected.

"For the past couple of years, Burroughs has had a flurry of announcements in the spring, or at least during the first half of the year. It may just be part of Burroughs' internal development cycle."

> ❞
>
> ***'Burroughs really has done a good job of getting products out to their customer base in recent years.'***
>
> — Steven Milunovich
> First Boston Co.

However, he added, "One possibility to keep in mind is that Burroughs does a lot of international business, and with the declining dollar they may want to take advantage of it because U.S. products are becoming cheaper to buy overseas."

The operating system announced last week is named MCP/VS 1 and, according to Burroughs officials, expands the capabilities of the MCPIX operating system that previously was available on Burroughs' V series and B2000, B3000 and B4000 mainframes.

Data link processors

The V 310-1 reportedly includes 5M bytes of memory and can address eight data link processors that allow communications with peripherals such as printers and disk drives.

The V 310-2 features 10M bytes of memory and access to 16 data link processors. Both models can be expanded to include 20M bytes of memory and access to 32 data link processors.

Burroughs said the V 310s include the same I/O subsystem as the V 340, transferring data to peripherals with an 8M byte/sec. band pass.

No performance estimates

The company released no performance estimates for the V 310, other than to say that performance is improved by 50% with an upgrade to a V 340 and by 140% with an upgrade to a V 380. Based on those statistics and earlier industry observers' estimates of the high-end systems, the V 310 will perform at 0.91 million instructions per second.

The basic V 310-1 costs $160,000, and the basic V 310-2 costs $210,000. They are set for July deliveries.

Burroughs also said the systems will support the same peripherals as the other V series systems as well as two existing lower cost peripherals.

Those two peripherals are a 491M-byte MD-4 disk subsystem with an average access time of 30 msec and a ½-in. B9498 tape streamer operating at 25 in./sec. with an average transfer rate of 40K byte/sec.

Up to 40M bytes

The new operating system reportedly allows the V series to address up to 40M bytes of memory, rather than the 5M-byte maximum allowed under MCPIX.

Early V series users reported last year that they had to use an interim solution, Burroughs' Quik Disk program, to overcome the 5M-byte limit.

Company officials also said an enhanced version of MCP/VS, Release 2, will be available during the third quarter of 1987 and will allow the V series to address up to 36 quadrillion bytes of memory, execute 10,000 concurrent jobs and control 10,000 disks and 10,000 other peripherals.

MCP/VS Release 1 costs $800 per month or $30,400 per year for V 310 systems; the system costs $1,200 per month, or $44,000 per year, which is the same price as MCPIX for V 340 and V 380 systems.

System failure halts trading at London Stock Exchange

By Stephen Arkell
Computerworld News Service

LONDON — The recent crash of a new electronic trading system at the London Stock Exchange halted options trading for a day.

The crash has cast a pall over the Stock Exchange Automated Quotes (SEAQ) system, which will be used for share trading when financial services are deregulated in London's financial district in October.

The failed system consists of five networked IBM Personal Computer ATs, with an additional AT as network controller. The system had been designed to cope with the increasing activity in options, instruments that give the holder the right to deal in a share at a future date at today's prices. The number of transactions in traded options has grown from around 8,000 per day six months ago to an average of 23,000 a day over the last month.

Matching buyers, sellers

The new system was due to take over the matching of buyers to sellers, previously carried out using a mainframe-based batch system at the London Options Clearing House.

The cost of the closure has yet to be assessed. The stock exchange's ruling body has now set up an official inquiry into why the system collapsed and whether any safeguards are needed to prevent future failures. Mick Newman, who is head of systems development at the exchange and is responsible for the traded options system, refused to comment.

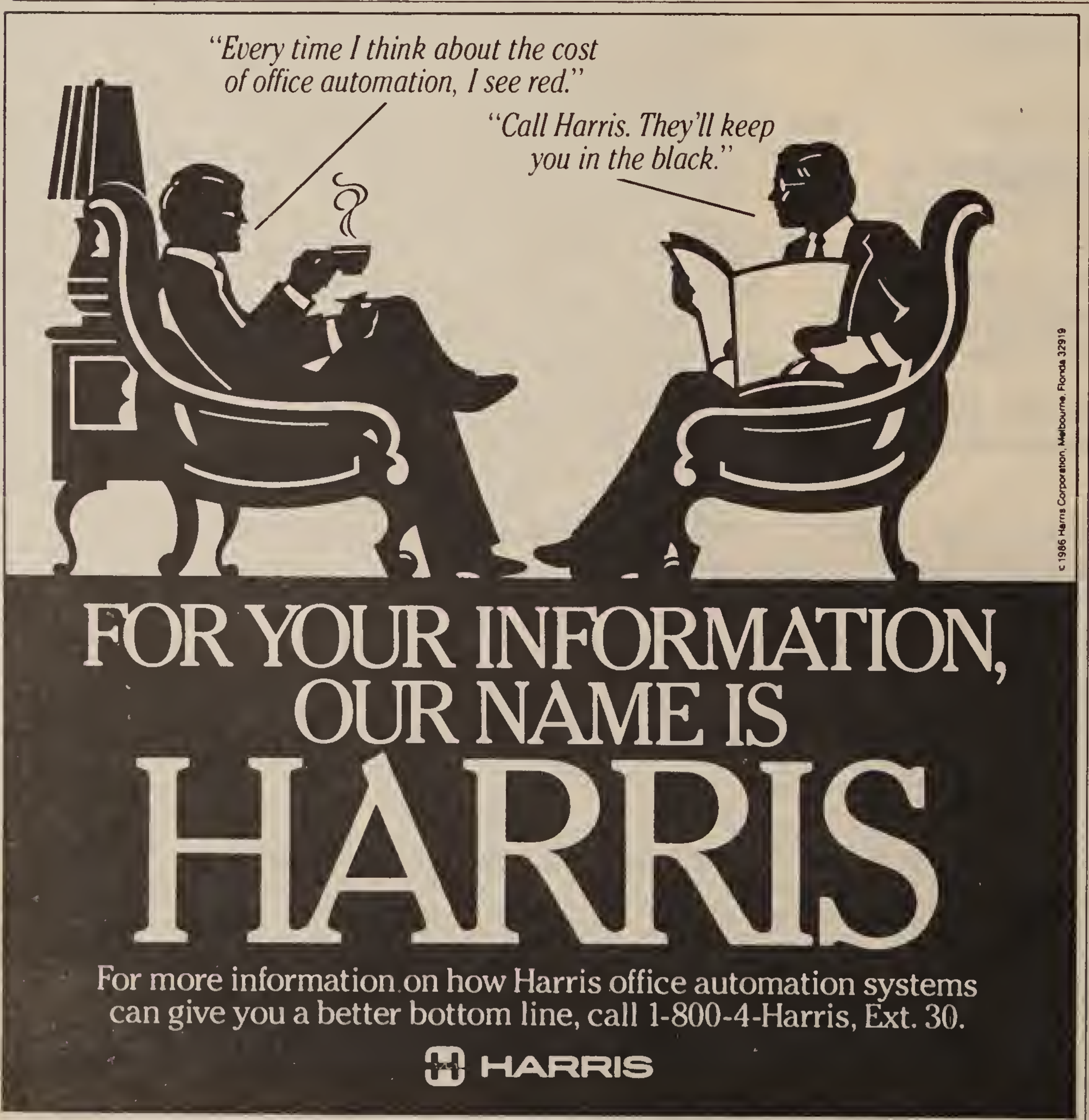
The networked system crashed on its first fully live day when two more personal computers were added to speed data input. The number of transactions during the day had reached an all-time record of 34,000.

"The software was perfectly all right," said a spokesman for the exchange. "But a hardware fault had developed in one of the terminals when the matching run had been completed." The fault locked up the network with the result that the market had to be closed to clear up the backlog left by the crash.

Brokers found themselves unable to offload out-priced options because of the closure and are up in arms about the failure. "As far as I'm concerned, it was a bit of a rash decision to take the bull by the horns and go live before it was fully tested," one broker said. "We can't afford for things like this to ever happen again." The system had been running in parallel with its predecessor for only three days before the decision to go live was made.

Brokers were also complaining about the lack of a backup facility for the system, which was originally specified three years ago. A spokesman for the exchange denied that there were any question marks hanging over SEAQ. "A corrupt terminal bears little reflection on a finished system," he said.

The SEAQ system, though much larger, has been designed to work along the same lines as the traded options system and uses the same local-area network. The London Stock Exchange has already spent $63 million on developing systems for the deregulation and recently raised an additional $57 million for development work.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3	IBM	12.2%
4	RDS	7.3%
5	Wang	7.3%

Source: 1986 Software User Survey published by SOFTWARE NEWS, Copyright ©1986 Sentry Publishing

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Chicago	March 13, April 16
Cincinatti	March 4
Cleveland	April 2
Columbia, SC	March 11
Columbus	March 5
Convent Station, NJ	April 7
Dallas	April 1, May 6
Dayton	April 3
Denver	March 13, April 8, May 15
Des Moines	March 19
Detroit	March 13, April 8, May 7
Ft. Lauderdale	April 10
Ft. Worth	March 11
Houston	March 20, April 17, May 15
Huntsville	May 8
Indianapolis	March 11
Iselin, NJ	March 20, May 15
Kansas City	May 6
Lansing	March 11
Little Rock	May 13
Los Angeles	March 13, April 8, May 8
Lubbock	April 8
Milwaukee	May 21
Minneapolis	March 27
New Orleans	May 21
New York City	March 11, 19, April 9, 22, May 14
Newport Beach	March 18, May 13
Oklahoma City	April 15
Omaha	April 22
Orlando	April 9
Philadelphia	March 20
Phoenix	March 27
Portland	March 4, May 6
Rochester	March 18
Sacramento	May 13
St. Louis	April 9, May 14
Saginaw	April 24
Salt Lake City	April 3
San Antonio	April 22
San Diego	April 17
San Francisco	March 25, April 24
Seattle	April 3
Sunnyvale	March 11, April 10, May 8
Syracuse	May 8
Tulsa	May 20
Washington	Mar 5,19, Apr 9,22, May 7
Wichita	April 15
Winston-Salem	March 27
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The trouble with having so many Picks to choose from

Legal questions prove nettlesome

By Maura McEnaney

LAS VEGAS — Legal battles over alleged copyright infringements between Pick Systems and sellers of products relating to its Pick operating environment were on the minds of vendors and users attending the International Data Base Management Association, Inc.'s (IDBMA) Spectrum U.S.A. exhibition in Las Vegas last week.

"The infighting in the Pick community has hurt the reputation of the system," said Robert Clearfield, vice-president for MIS at Delaware Valley Underwritng Agency, Inc. "The money that is being spent on lawyers' fees would be better spent on marketing the Pick systems."

Known for its data base management capabilities and its portability across a range of systems, Pick runs more than 2,000 software applications packages, making it a popular operating system for small to medium-size businesses. The operating system is licensed to 25 systems integrators, hardware manufacturers and OEMs.

In December, Pick Systems sued Vmark Computer, Inc. of Natick, Mass., charging the company with copyright infringement and trade secret violations of the Pick operating system.

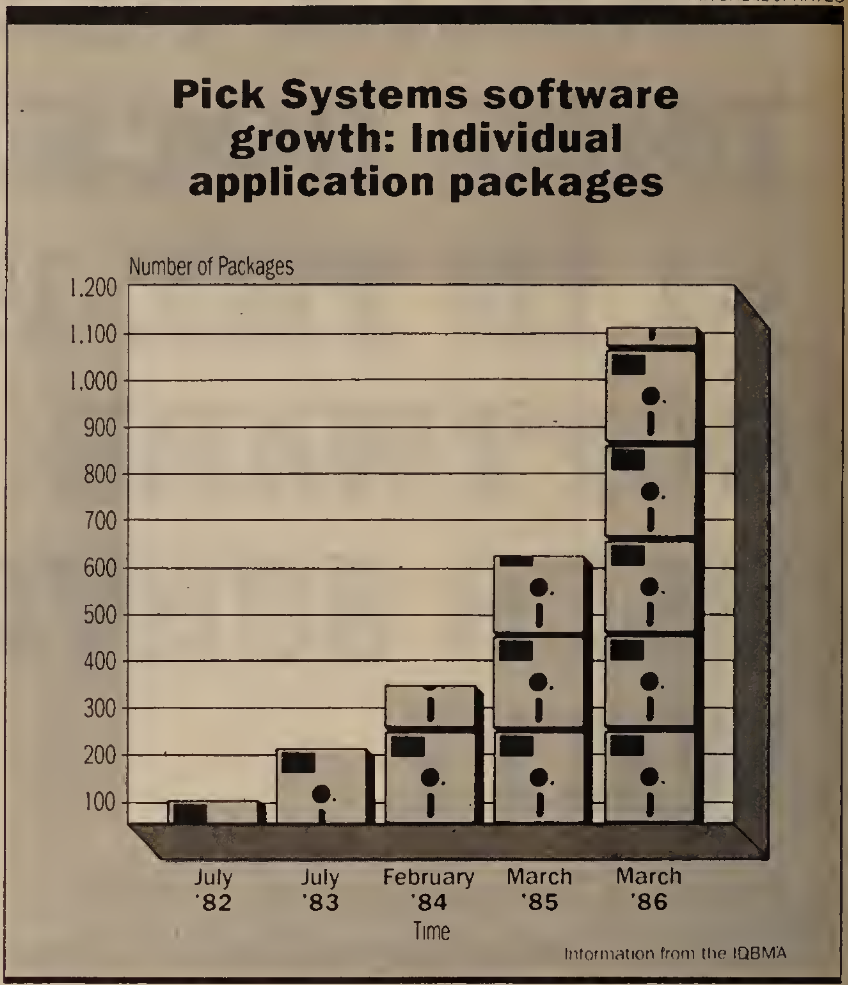
In October, Vmark announced an agreement with AT&T Information Systems to provide a Unix connection to the Pick operating system, thereby giving the users of Unix-based hardware access to the numerous business applications that run on Pick.

Pick developing Unix link

Pick, meanwhile, is developing its own version of a Pick-Unix connection and hopes to announce a similar link sometime this year.

The Pick suit claims that Vmark had access to Pick's source code and seeks $5 million in damages. There are some indications that the suit could be settled out of court.

MITCHELL J. HAYES



Information from the IDBMA

There was also some speculation at the show that Pick is also reviewing the efforts of Ever-On Corp. of Houston. The company has a product that allows users to run Pick-based applications on Tandem Corp. fault-tolerent machines. Through the Vmark process, the Pick applications run as a task of Tandem's Guardian operating system. Like Vmark, Ever-On is marketing its product without a Pick license. "They haven't approached us on it," Ever-On President Randy Jordan told *Computerworld*.

Although Pick Systems was not among the 50 IDBMA exhibitors at the MGM Grand Hotel, the company used the show to announce Version 2 of its operating system for the IBM Personal Computer XT.

The new release will be available in April and includes an applications generator and a data transfer bridge between files created under Pick and Microsoft Corp.'s MS-DOS operating system. The software is priced at $495.

The lack of standards among manufacturers of Pick-based systems was a major conference topic. Because each OEM licensee can enhance the Pick operating system in its hardware implementation, some Pick applications may not run on all machines.

"There is no longer a generic Pick," said Chandru Murthi, a San Francisco-based consultant. And since Pick Systems has not moved to create a set of standards within the operating system, that responsibility now goes to its licensees, Murthi added. "We need a leader, and the leader is not Pick Systems," he said.

The first set of standards for the Pick operating systems was scheduled to be announced this week by the Spectrum Manufacturer's Association, a group of 16 manufacturers of Pick-based systems.

Comdex Japan: Few systems

By Yasuko Yoshimi and Takehisa Kondoh
Computerworld News Service

TOKYO — Many of the 20,000 visitors to the four-day Comdex Japan '86 exhibition held earlier this month were surprised to discover that far fewer computer systems were on display than at last year's first Comdex Japan.

Instead, vendors and dealers were emphasizing their peripherals, software and networked products at Tokyo's Harumi International Exhibition Center.

Omron Tateisi, of Kyoto, Japan, used the show to announce the Omronix, a Japanese-language version of AT&T's Unix System V.

Simple, Inc., a firm closely tied to U.S. vendor Fox Research, Inc., showed its 10-Base III software, which it calls the "first multiuser-oriented relational data base ever in Japan."

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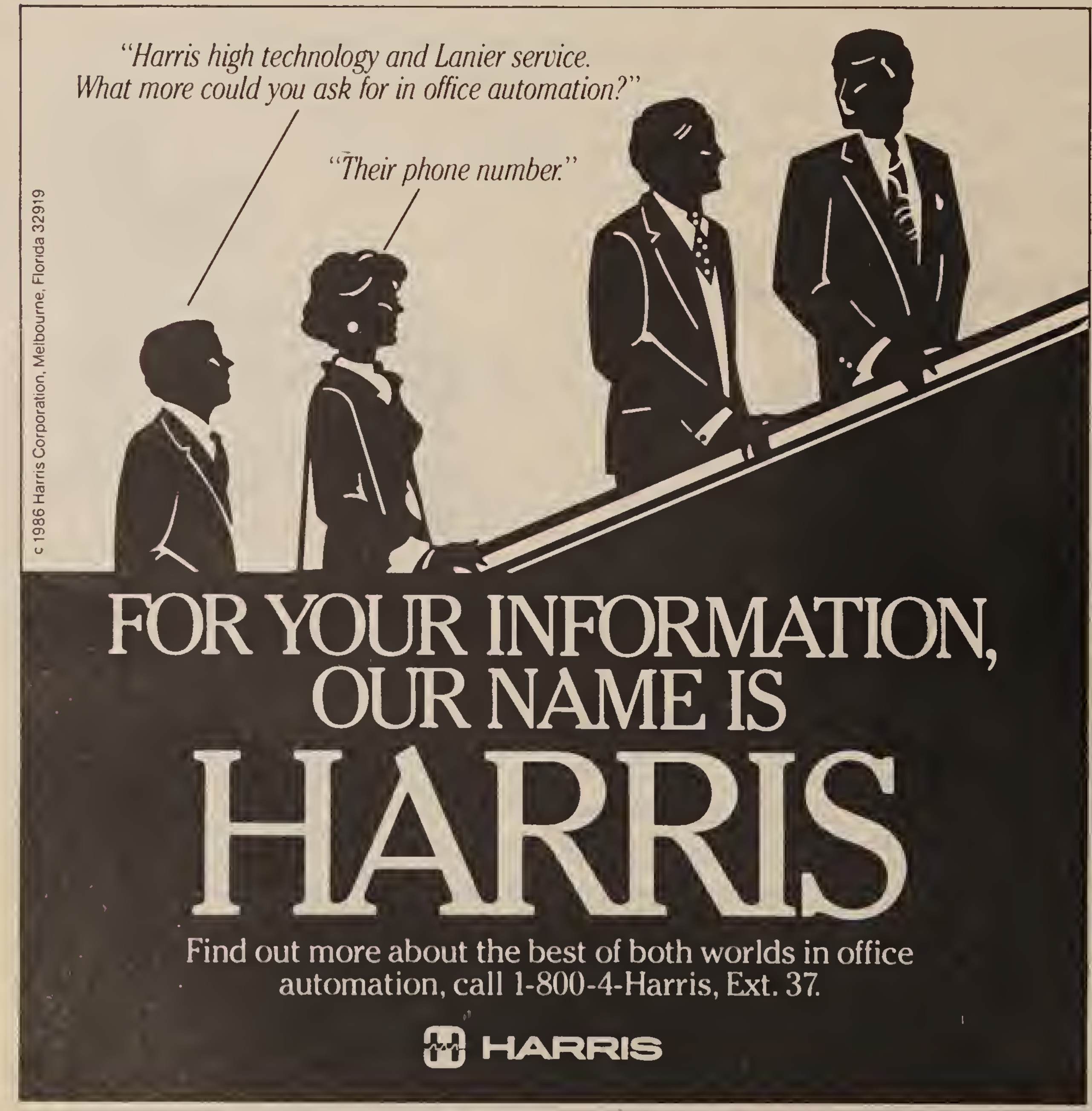

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California teens charged with credit bureau hacking

Police bait suspects with hot hardware

By Jeffry Beeler

SUNNYVALE, Calif. — Police in this Silicon Valley community recently nabbed a band of youthful hackers who allegedly broke into a major credit bureau's information system and used stored information on customer credit lines to fraudulently buy microcomputer hardware.

All of the suspects, ranging in age from 14 to 18, were apparently users of an underground electronic bulletin board from which they obtained a password and access codes for TRW, Inc.'s mainframe system in Orange, Calif.

Operated by TRW's Information Services Division, the system uses an IBM 3084 Model Q and a 3033 Model AP to maintain confidential credit histories on some 120 million Americans.

The intruders also obtained several of their neighbors' private charge account numbers by fishing discarded credit card carbons from garbage bins at local shopping centers, according to Lt. Robert Seely of the Sunnyvale Public Safety Department.

Using Commodore Business Machines, Inc. Model 64 and Model 128 home computers, the youths allegedly gained unauthorized access to cardholders' TRW-stored financial records and noted their credit limits and current account balances.

After deciding how much merchandise they could safely charge to each account, the hackers used the stolen credit card numbers to order at least one $1,700 IBM Personal Computer over the phone, Seely said.

Following the arrests, investigators informed TRW of the suspected breach of its systems security. Thus far, however, police have released no evidence to support their suspicions other than the hackers' own boasts, according to TRW spokeswoman Delia Fernandez.

Police have not verified access numbers

"When we asked the police whether they had recovered any TRW passwords from the suspects, they said they hadn't," Fernandez said. "They also told us that they hadn't called up any of the telephone numbers in the kids' possession" to verify that they indeed correspond to the firm's mainframes.

Seely acknowledged the second of Fernandez's claims but defended the police inaction. "During our investigation, we've discovered the phone numbers to a lot of other companies' computers besides TRW's, and we haven't had someone working full time to check them all out," Seely said. He flatly denied assertions that police had failed to find any TRW passwords.

On March 20, TRW dispatched two of its security experts to Silicon Valley and offered to help police with their investigation. But the offer was refused on the grounds that all the suspects are juveniles. "We were really shocked by the police response," Fernandez said. "This is the first time that our assistance has ever been declined."

Suspicions that TRW's system may have been a recent hacker target first became aroused when one of the teenagers' neighbors notified police of a home delivery of a personal computer he denied ever ordering.

Rather than return the unwanted hardware to its source, police left the parcel by the neighbor's doorstep, concealed themselves and waited to see if anyone would claim it.

Within hours, their ploy had netted them two suspects, both local high school students, who were charged with grand theft and possession of stolen property. Soon afterward, police arrested several other youths on the same charges.

Former federal employees guilty of rigging computer contract bids

By Mitch Betts

WASHINGTON, D.C. — Two former computer managers at the U.S. Postal Service have been convicted by a federal jury of operating a massive bid-rigging conspiracy involving $2 billion worth of federal computer contracts.

Prosecutors said Ronald J. Perholtz left the Postal Service in 1977 to perform consulting and sales work for various computer vendors. He then conspired with Franklin W. Jackson, head of the service's office of financial planning and systems from 1976 to 1983, to steer government contracts to Perholtz's clients.

The jury convicted Jackson and Perholtz, former general manager of the Postal Service's accounting division, of racketeering and mail fraud. The jury also ordered Perholtz to pay back more than $850,000 that the government said he obtained illegally through the bid-rigging scheme.

The verdicts, issued March 14 in U.S. District Court in Washington, came after an eight-week trial for what prosecutors said was the largest procurement fraud case ever tried in the nation's capital. Sentencing is expected next month.

Prosecutors said Perholtz and Jackson orchestrated a complex web of kickbacks and bribes — including a Florida condominium and a $45,000 boat — channeled through real and dummy corporations to corrupt the procurement process.

Postal inspectors became suspicious when they discovered that Gregory W. Fletcher, a Perholtz associate who helped design three separate Postal Service computer systems, owned a Florida condo with Franklin Jackson, the Postal Service's project manager of the three computer projects.

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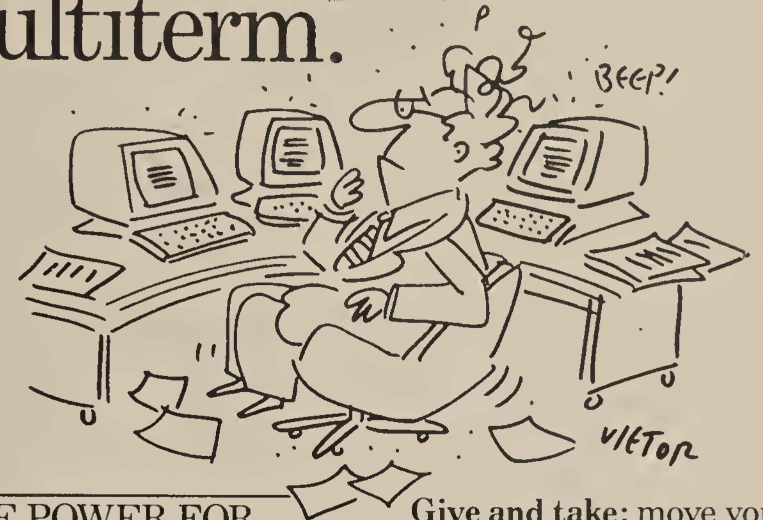

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Houston last showplace for floundering OAC exhibition

May be combined with another meet

By Donna Raimondi

HOUSTON — The Office Automation Conference (OAC) — which made its 1980 debut in Atlanta — took its final bow in Houston last week.

The thinly populated conference went out with a whimper minus exhibits from some of the industry's acknowledged leaders in office automation, such as Wang Laboratories, Inc., Data General Corp. and Compaq Computer Corp, although Compaq Chairman Rod Canion was the keynote speaker.

Despite claims by the sponsoring organization that the show registered 15,000 participants, few vendor booths lined the floor, and attendees at several sessions and on the exhibit floor were scarce.

OAC's host, the American Federation of Information Processing Societies, Inc. (AFIPS), has decided to roll the OAC into a broader conference format after surveying the exhibitors and attendees in the last three years, said OAC spokeswoman Katherine Stormont. The OA tag limits the scope of the show, she said. "To keep up and move with office automation technology, we would [like to] open up the conference to include other forms of automation, such as home and factory."

AFIPS is considering rolling OAC into the Business Systems and Applications Conference (BSAC) scheduled for March in New York. Another option AFIPS is considering is merging both BSAC and OAC into its NCC Telecommunications show scheduled for September in Philadelphia. A final decision will not be announced for at least two weeks.

The difficulties that will lead OAC to its future inclusion in other shows instead of warranting its own were evident in the variety of opinions expressed by speakers and attendees.

Compaq's Canion declared that there was "no possible alternative" to personal computer-based (specifically IBM and IBM-compatible-based) office automation. Minicomputer- and mainframe-based OA systems are limited and monolithic, he said, requiring users to change the way they perform their jobs.

But the OA picture is not that limited, said Patricia Seybold of Patricia Seybold's Office Computing Group in Boston. "If you want to network PCs, go with other vendors," she said, "but if you want to use minis with office systems, go with DEC."

> **''**
>
> ***'We would [like to] open up the conference to include other forms of automation, such as home and factory.'***
>
> **— Katherine Stormont**
> **OAC**

DEC's All-In-One office system is mature and supports IBM PCs better than office systems from other major mini makers such as Wang and DG, she said.

OA administrators must pull from several vendors and put together the best system they can make, said James Goodman, a show attendee who is manager of information systems and planning at RCA Labs, Inc. in Princeton, N.J. He said it is not necessarily up to the vendor to know what each customer needs.

"The software, hardware and support has to be tailored," Goodman noted. System integration is important, but customers cannot rely on the vendors for that, he added. His predominantly IBM shop uses both DEC's minicomputer-based All-In-One and Apple Computer, Inc.'s Macintoshes for OA applications.

Future innovations in OA will come from adoption of local-area networks, an area where no vendor is yet preeminent, said Michael Alsup, program chairman of OAC. Alsup is an office automation and image processing consultant at Arthur Andersen & Co. in Houston. Innovation will be in network management systems and builders of more powerful applications, Alsup said.

Seybold claimed that the end-user element of computing is more important than all the new technologies and features becoming available. In five years, she asserted, most strategic business applications will be written by the end user at the departmental level, leading to an "absolute role reversal" between end user and MIS staff, with the MIS people taking responsibility for maintaining user-written applications.

When asked if they would attend OAC when it is rolled into another show, vendors and attendees alike took a wait-and-see attitude. "We will have to see what it evolves into and if we can reach the kind of people we want to reach," said Apple spokeswoman Renee Rodrique. The Apple booth, which was exhibiting third-party desktop and communications software, was one of the busiest at the conference.

Another booth with a good draw was Soft-Switch, Inc. of King of Prussia, Pa., a leader in the document conversion market. "We would be more apt to go to OAC again if it were rolled into the NCC Telecommunications conference," said Judy Slattery, marketing services manager. "A lot of the people stopping by are Houston based, so its like a regional show this year."

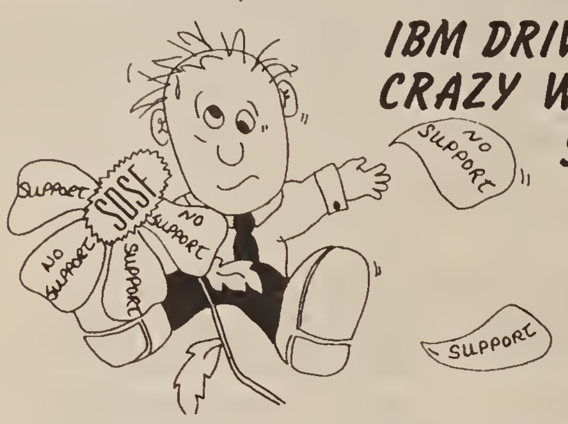
Indeed, many of the attendees got into the show with free passes from local computer stores. Even for free, some were disappointed. "I came here looking for Compaq or Wang, because we have had problems downloading from our Wang VS to the Compaq," said Jim Huse of Primary Fuels, Inc. of Houston, who got a pass from a computer store.

Won't go to show again

Neither of those vendors exhibited, so Huse could not find a solution to his problem at OAC. Foiled in his search, he decided to look for an optical character recognition scanner and could locate only two vendors with that product. "I don't believe I will go to the show again," he added.

Kathy Teter, operations analyst at Houston-based Marathon Manufacturing Co., which makes offshore oil rigs, came to the show looking for software for her IBM Personal Computer ATs used for word processing. "I'm disappointed in the number of booths," she said. Teter would probably not journey to New York or Philadelphia for another version of the show, she said.

"It has definitely become a regional show," said Honeywell spokesman William McCree. The number of exhibitors and attendees has subsided in the last three years, he said, and Honeywell will review and consider what it has gained from OAC before committing to future shows.



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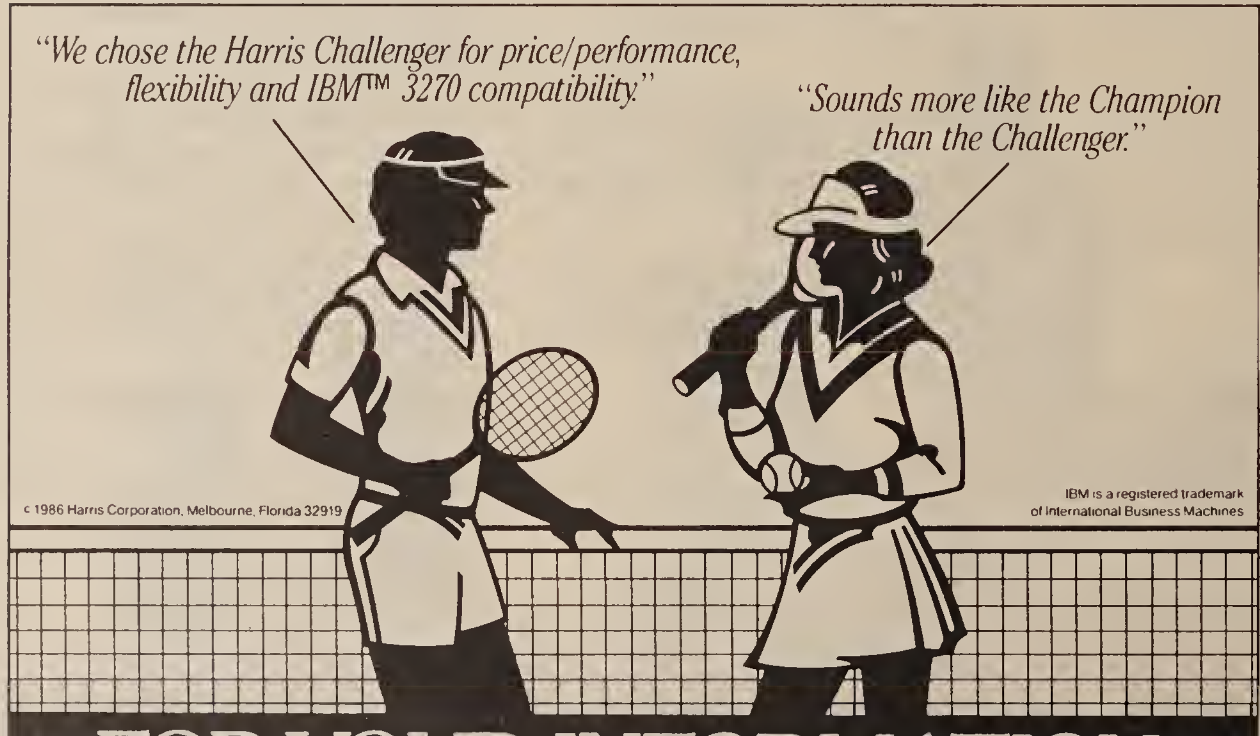
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VIEWPOINT

EDITORIAL

When confusion reigns supreme

One early symptom of enfeebled regimes is a muddle of word and deed that evinces an internal confusion of purpose to the outside world. While IBM may not be toppling, it has lately displayed all the confusion of the feeblest of doomed oligarchies.

The most recent evidence was last week's announcement of the PC-DOS 3.2 operating system upgrade, an operating system for a network architecture that IBM announced five months ago and that supports a 3½-in. disk drive, which IBM has yet to announce.

The announcement was made in a letter to authorized IBM dealers on March 18, with no fanfare and few details. In fact, when a spokesman for PC-DOS vendor Microsoft Corp. was contacted a few days later, he refused to comment because he did not know 3.2 had been made public. Only after he had called IBM was the Microsoft spokesman able to refuse comment and to refer all inquiries to IBM.

Not that IBM was much better prepared to deal with questions about 3.2. A spokesman was able to provide names of new commands, but he offered few details on what the commands did or what benefits they held for users.

All clear? True, IBM has not actually *shipped* its Token-Ring network, and it is *supposed* to introduce a 3½-in. drive product sometime soon, but still . . .

IBM has never been one to grovel before user demands. But the rules of the game have changed: Users are more sophisticated, hence more demanding; their needs are diffuse, and the tools to solve them are legion. People may still never get fired for buying IBM, but buying IBM is no longer the easy out it was when the 360 ruled the DP world. User reaction was cool to the 3090, to the System/36, to the PCjr — and, rather than override the objections with a serene "Take it or leave it," IBM suffered significant blows to its bottom line and its public image.

PC-DOS 3.2 may well be a splendid precursor to a brave new world of IBM computing. Nirvana may be ours on April 2, 8, 15, or whenever. Maybe. Meanwhile, there is muddle and confusion. If there *is* no change, the risks and the consequences are greater than ever before. Even for IBM.

Notes & observations

Popular videotex services may not have expired completely with the recent discontinuation of offerings by Knight-Ridder Newspapers, Inc. of Miami and the Times-Mirror Co. of Los Angeles, but they certainly received what in sports is called a career-threatening injury. These two media giants both attempted to sell the public expensive in-home, interactive information services without first ascertaining whether the public had the slightest interest in these services. Now both companies have apparently failed, at considerable financial loss. While we take some comfort in the free market having once again dealt effectively with a supply for which there was no demand, we believe that there is an important and implicit message here for all technology vendors: You do yourselves and the user community the most good when you satisfy a real and urgent application need.

I'M SORRY MR. MARCOS, THERE SEEMS TO BE A PROBLEM...
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GUCCI

LETTERS TO THE EDITOR

More cheers: Pick operating system

I would like to join with the writer of the letter "Pick of the operating system litter" [CW, Feb. 17], in his praise of the Pick Systems' Pick operating system.

I have been using Pick on various machines for over nine years, from its original implementation on Microdata Corp. computers. The Pick operating system is exceedingly capable, flexible, powerful and easy to use, but why don't we see more about it in the press?

Pick was "relational" long before it was deemed a good thing to be so. It was built with a nonprocedural query language as an inherent part of the system, not as an extra cost option.

I have worked with an application that was transported under Pick from a time-sharing system down to an IBM Personal Computer with a bare minimum of program changes. This same application is currently being run and supported on computer systems from four different vendors within the same time-sharing service. I doubt that under any other operating system — even Unix — these could be cost-effective options.

So please leave Unix where it belongs — in the lab. Let's hear more about Pick. It is a proven operating system that was designed for use by business.

Michael Gwinnell
Business Computer Installations
Kenai, Ala.

Ada one of programming's Edsels?

Just when it looked like Ada was going the way of the Sergeant York gun, along comes someone to reassure us that, yes, it is indeed alive and well in the article "Ada: A better choice" [CW, Feb. 10]. Unfortunately, I found nothing to indicate that we can make a silk purse from this sow's ear.

Ada's credentials are simply not impressive. "Efficiency? The results have been extremely encouraging," the writer claims. Yet this assertion is followed with benchmark tests against Pascal and C — languages not heralded for speed. Had the writer tested against BAL or Cobol and been able to make the same claims then we would have something. But Pascal?

Another criterion was the quest for better portability. Acknowledging that portability has been an industrywide problem since "the second computer was invented," the writer apologizes for Ada's inability to perform better than other languages. A case is provided where Ada code was moved successfully between three hardware configurations, but the writer meekly ends by saying that the time frame for the conversion "would have been unachievable had any other language been used." Did the writer attempt the same conversion with code in other languages? And if so, were they equivalent or was the Ada code specially sanitized for this test?

I am not convinced that Ada is a better choice; it is only one, which, industrywide, adds yet another tier to the programming Tower of Babel.

Steven Rosenberg
President
FF High-Values Computing
Montclair, N.J.

What the world needs now is Multics

A recent letter to the editor " 'Fan' defends the virtues of Multics" [CW, Feb. 3] understates the severity of the loss that Honeywell, Inc. has caused by withdrawing support for its best operating system, Multics.

Although the technology underlying Multics is two decades old, not a mere 15 years, it has still not been absorbed into the mainstream. Vendors, including Honeywell, show no sign of adopting the more important functions of Multics for release in three to five years; in fact, they show no signs of even being aware of those functions.

Unix is not based on Multics. Although the people who implemented the first few versions of Unix had exposure to Multics, there is nothing in Unix to show that. In fact, the architecture for which Unix was originally written lacked the paging and segmentation capability required to implement a unified storage/file system; yet the single most important feature of Multics is the integration of the virtual memory with the file system.

The reader who is interested in what he is missing can get an overview from the *Multics Papers* in Section 6 of the 1965 Fall Joint Computer Conference American Federation of Information Processing Societies, Inc. Conference Proceedings, published by Spartan Books and Macmillan and Co. No other system comes close to fulfilling the design goals set forth there.

Seymour J. Metz
Annandale, Va.

WEEKLY.

COMPUTERWORLD

IBM users confused by net reversal

'Get tough,' DPers urged

Apple push on for more system links

Improved Mac, IBM, DEC compatibility is targeted

On the job: Hartford's blueprint for a D

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3317-8613

VIEWPOINT

Finding future managers: Cutting through the hiring freeze

By WALTER F. CUIRLE

Hiring a new person has never been a simple matter, but in the last few years it has become even more complex. This is particularly true in large companies that have adopted hiring freezes or similar policies that strictly limit the circumstances under which you can bring on a full-time employee. In many cases, the hole in the hiring policy that lets you staff up to the numbers you need is the permission to hire contract employees on a temporary basis for a particular project.

A major disadvantage of this approach lies in its potential for disrupting the continuity in your departmental management family. In the past, when virtually everyone on the staff was a full-time employee, you could hire someone on the basis of proven short-term technical ability with maybe the promise of management potential, then offer a few more demanding assignments over the next few years to see how that potential might develop. Eventually, if you got a good response to those test assignments, you might tap the person for promotion.

If hiring limitations have been in force for any length of time, you probably have a much smaller pool from which to choose your future supervisors and managers. The pool is smaller because the number of full-time corporate employees in your department is smaller and it is from this group alone that you must choose your future leaders.

The net result of this situation is that, when you are allowed to hire, you have to be a lot more cautious about whom you hire and particularly why you hire them. You must keep a fresh supply of management talent on hand, a need that becomes greater the more restricted you are in your hiring. If you are faced with hiring limitations for an indefinite length of time, then every new hire is potentially on a management track from the first day. In consequence, you may want to set different priorities on the qualities that you look for in a new hire. You really can't hire just on the basis of proven technical ability with the promise of management ability. You need a proven assay in both areas.

MANAGEMENT MATRIX

Does this mean that a new MBA is always preferable to a seasoned systems analyst? No, but it does mean that you have to sit back and think about just what you mean by "seasoned" and just what it is you think you are buying when you require a particular flavor of college degree.

Seasoning is not just a matter of years of experience. It is more a matter of variety in the job than time on the job.

The questions you would need to ask are straightforward, and you have asked them before: How many maintenance projects? How many development projects? Any experience in working directly with end users in that development?

You can assay management ability in a similarly indirect manner. In an interview situation, evidence of management ability translates into evidence of goal orientation, initiative and a willingness to take on additional responsibility. Ask a candidate point-blank what evidence there is for management ability and you are likely to be shown promotions. You can assume that those promotions indicate recognition of something, but you have to find out what that something is. Three promotions in five years are just three changes in title if the nature of the work has not changed. What is the difference between this title and that one? Did you want the promotion? What did you have to do to earn it? If the answers boil down to "Seniority," and "It makes no difference," followed by "Keep my nose clean," you may be looking at routine seniority promotions. That is not encouraging. On the other hand, the candidate may simply be as dissatisfied with that kind of system as you are, and that's why this interview is taking place.

If the title changes turn out to mean little or nothing, look at how the job was handled. What was the basic job description? What did the candidate do, or want to do, that went beyond those requirements? How was it done? The thing to look for here is the development of an idea and the sale of it to management.

No matter what answers you get to those questions, there are other places you should look for the abilities you want. Participation as a volunteer is often a last-ditch question asked to gauge the initiative of entry-level candidates. It should not be. It is an equally valuable indicator in experienced candidates as well. For example, membership in one or more of the recognized professional organizations is laudable but fairly ordinary; however, if your candidate has volunteered for the thankless routine of making the organization run, then you may have struck gold.

Another area to look at is education, both formal and continuing. A programmer with a B.A. in philosophy and two years of experience who also worked for one of the professional technical certificates is likely to be a better bet in the long run than a B.S. in mathematics with two years of experience who has done nothing outside the basic job description. Regardless of your opinion of the intrinsic value of the certificate, you have to admit that it takes effort and initiative to get one.

Finally, talk to the references. Good references from people who recently worked with or under your candidate are more useful than references from the programmer at the next desk in the last job. If your candidate ran a project, references from end users of that project are very useful indeed.

When you have finished all that, and are satisfied, ask one last question — this time, of yourself. You have before you a candidate with talent, goals, initiative and the willingness to take on responsibility. Is this someone you could be comfortable with as *your* supervisor?

Cuirle is a senior associate with Nicholas DeMaio Associates in Bryn Mawr, Pa.

Comecon countries struggle, look to the West for high-tech expertise

By DOMINIC IMONTI

I recently returned from a trip to Hungary, meeting with the Deputy Minister of Trade and Commerce and the key managers of Metroplex, which handles all the computer peripherals activities in Hungary. I was there at their request to review the state of their technology and their capabilities. They are seeking a role in eventually manufacturing for the Western world.

The Hungarians are looking for opportunities to negotiate manufacturing licenses for older technology products that the West is regenerating as a means to obtain hard currencies by selling the product to Westerners. They believe that involvement with the West is now a necessity and that the potential market is tremendous compared with the size of the market within the Council for Mutual Economic Assistance (Comecon) group of countries. But they face tremendous problems, problems that may in fact be insurmountable.

First, their technology is at least 15 years behind ours. We visited several factories and production facilities, and they showed us the best they had to offer. We saw a 2.5M-byte head-per-track-type device, a 5¼-in. disk and an 8-in. floppy disk . . . but in every case we saw only one example. We saw no actual production going on.

From what we saw, it was an achievement for them to produce a 2.5M-byte head-per-track disk. In talking with them about 5M-byte head-per-track drives, it was clear that they do not have a capability in that area. Of course, we evolved away from the head-per-track concept 10 years ago, and yet that is a capability they are proud of today.

READER'S PLATFORM

The Hungarians are extremely vertically integrated, trying to do as much of the manufacturing from raw materials as possible. But the movement between players in the vertical integration chain is extremely slow, and depending on the availability of raw materials and the number of competing projects and priorities a given facility may have, delivery on promised parts or products is unreliable at best. The cheapest commodity they have is labor; they pay, considering all the deductions, about 60 cents per hour to the average employee. And yet the savings on labor cannot make up for the systems and technological deficiencies they face.

Probably the biggest obstacle the Comecon countries face is their lack of understanding of the concepts of competition and marketing. In order to work with the Western world, these tenets of our very structure and business life must be well understood. And they are not. For example, the need and the importance of providing ongoing service and support to their customers is not appreciated. The need to develop a marketing program, including advertising, public relations and collateral support, is not realized. The entire concept of competition is not one with which the Comecon manager is familiar. Business success is based more for them on achieving the necessary directives and waiting their turn in line than it is on staking out a competitive niche in a developing market or selling the consumer on the value of Brand X over Brand Y.

Even the labor force suffers from the lack of competition in the environment. The incentives for excellence are weak. To many, their goal is to minimize any potential conflict and perform just what is expected. There really is no place for the entrepreneurial spirit that is so prevalent in the Western world — particularly in our computer industry — and that is so clearly responsible for the strong business growth we enjoy.

Even if the Comecon countries could overcome these obstacles, one wonders how great the trust level can be when actually doing business with them. If I sign a contract with some company in Bulgaria, Hungary or Poland, how long will I get product support? If they fail miserably, and I go into the courts in Poland, for example, what recourse do I have?

It seems that the basic political, sociological and technological structure of the Comecon countries is so different from that of the Western world that, in order to succeed, they will need to hire Westerners to do the job. But Westerners don't react and behave the way their current labor pool and managers do. If they hire Westerners, they will lose the ability to control, and that is a fundamental problem for them. Yet how can they work with a society as different as ours unless they are able to better understand us, to work within the world the way we know it? They will need to become a more open, spirited, free society themselves in order to understand what makes us tick. And that seems to be a far greater challenge than simply modernizing their technology.

Imonti is vice-president, marketing, for Pertec Peripherals Corp. in Chatsworth, Calif.

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SYSTEMS & PERIPHERALS

HARD TALK
James Connolly

A tough act to follow

Two years ago, a person might have thought the battle for the tape drive business was won. IBM finally had announced its long-awaited 3480 cartridge drive and had frustrated its competitors by offering a few unexpected, tough-to-imitate features.

IBM had the head start in a market where it already dominated the processor business, and the 3480 business soared. There was, and remains, little doubt that 3480-type technology is destined to control the high-end, off-line storage market.

But the question remains whether even the 3480 can prove as durable a market force as was its predecessor. That predecessor was the IBM 3420 reel-to-reel tape drive technology, which was a standard for 16 years and was implemented as recently as early March in IBM's newest tape drive, the 3422.

The longevity of the 3420 became more apparent in a recent *Computerworld* feature story about how data centers are migrating to the 3480 [CW, March 24]. That article quoted International Data Corp. estimates showing that IBM sold 8,000 3480s in 1985, compared with 12,000 3420s and 3420-compatibles sold. It is true that the 8,000 3480 sales represent a greater storage capacity than the 12,000 reel-to-reel drives, but that 12,000 figure illustrates how strong the 3420 has been. IBM seemed to recognize that strength with the 3422 announcement in which it targeted that machine for IBM 4300, 3080 and 3090 mainframe sites where management has opted to

See **TOUGH** page 21

Connolly is Computerworld's *senior editor, systems & peripherals.*

Transition to 3090 runs without hitch, bank says

By James Connolly

BOSTON — The first users of IBM's 3090 Model 180 mainframe reported last week that installation and the changeover from diagnostics to production mode ran smoothly.

The Shawmut Corp., a Boston bank, received the uniprocessor system on March 17, a little more than a month after the system was introduced by IBM. The installation took less than a day, and the changeover to production was completed the following weekend.

The Model 180 replaced an IBM 3083 as Shawmut's on-line production system, serving 1,700 terminals and 400 automated teller machines. The 3083, in turn, will replace an IBM 3033 as a development and batch system.

'Get the box in and then move the I/O'

"It is not much faster than the other machine yet, because we do not have the I/O configured the way we want it, although some jobs are running noticeably faster. What we wanted to do first was get the box in and then move the I/O as needed on weekends," said Shawmut Assistant Vice-President Richard Mulcahy, who is in charge of hardware planning.

He said that to speed installation of the mainframe, the new system was installed using the same basic wiring that ran the 3083.

According to Mulcahy, the only snafu encountered during installation was a relatively minor cabling problem in the connection of an IBM 3880 controller, which Shawmut had planned to add to its systems even in the event of a 3090 acquisition.

Mulcahy said the company laid out its 3090 system in a way that will allow minimal realignment of computer room peripherals if Shawmut decides to upgrade the Model 180 to a 3090 Model 200 dual processor or a Model 400 quadratic processor in the future.

Sun Microsystems announces high-end, gray-scale workstation

By Rosemary Hamilton

MOUNTAIN VIEW, Calif. — Sun Microsystems, Inc. last week added a high-end, gray-scale model to its Sun-3 workstation line. The product will compete with Digital Equipment Corp.'s gray-scale model of its recently announced Vaxstation II/GPX line.

The Sun-3/160G, with an entry price of $29,900, was designed for such applications as technical publishing, mapping, image analysis or any job that needs distinctive shading but not full color. It costs about $3,000 less than the DEC workstation.

Atex, Inc. said it plans to use the model in its Publication Design and Ad Placement product, which is used for interactive page and display advertisement makeup. Interleaf, Inc., a Sun OEM, is testing the model and looking into the possibility of reselling it, said Jim Ricotta, Sun product manager.

The workstation, which operates under Sun's version of AT&T's Unix System V, is based on the Motorola, Inc. 68020 microprocessor and comes with a 12.5-MHz Motorola 68881 floating-point coprocessor and 4M bytes of memory, which is expandable to 16M bytes. It can be used as a diskless node on a network or as a stand-alone system with local mass storage. Mass storage is available in disk and tape configurations from 71M bytes to 1.5G bytes.

According to Ricotta, the Sun-3/160G is similar to other workstations in the Sun-3 line, with the exception of its black-and-white monitor that produces 256 shades of gray.

It also includes the Sun Graphics Processor board, which was previously available only for color workstations. It is scheduled to ship in May.

INSIDE

Sperry offers two optical disk storage systems/**24**

3M introduces a 35mm laser film plotter for computer-aided design systems/**24**

NEW THIS WEEK

- Digital Equipment offers the LG family of printers
- Wespercorp announces the TDQ-QIC tape coupler
- For more on these and other new products, see pp. 73-83.

INSTANT ANALYSIS

"With corporate profits under pressure, a lot of mainframe orders are being pushed off until later in the year because DP is still seen as a cost center. DP spending will pick up by the end of the year."

— Steven Milunovich, analyst with First Boston Co.

Elxsi cuts prices on multiple-processor configurations

Discounts intended to spur parallel processing

By Jeffry Beeler

SAN JOSE, Calif. — Elxsi has slashed by up to 50% the per-processor prices of its multiple-CPU configurations. The cuts coincided with the announcement of the firm's first two packaged systems.

In the wake of the recent announcement, Elxsi is now offering its existing processors in four-CPU and two-CPU versions. For the four-processor package, the price is almost 53% less than what a user organization would pay if it bought the same number of machines individually. For a dual-CPU configuration, the per-unit price cut totals almost 33%.

In reconfiguring its existing processors as packages and selling them at discounts, Elxsi seeks to stimulate user demand for its multiple-CPU systems.

'Think in terms of parallel processing'

"What we're really after is to get our customers to think in terms of parallel processing," said Gene Amdahl, chairman of Trilogy Ltd., Elxsi's parent company. "Obviously, you can't get them to think of parallel processing if they're buying only one processor."

To date, single-CPU configurations have accounted for roughly half the firm's hardware sales by volume, according to cofounder and Chief Executive Officer Joseph Rizzi.

In a four-CPU configuration, an Elxsi system reportedly provides about twice the performance of a Digital Equipment Corp. VAX 8800 for approximately the same price — $695,000 — compared with $650,000 for the 8800. A dyadic version equals the throughput of an 8800 for a lower price of $495,000, according to Elxsi President Peter Appleton-Jones.

No choice but to buy separately

Previously, users had no choice but to buy Elxsi machines separately for $369,000 each, Appleton-Jones said.

Founded in 1979, Elxsi supplies commercial users with scalar minisupercomputers for complex scientific and engineering applications. Up to 12 of the vendor's System 6400 machines can reportedly be coupled to form configurations that execute a total of 72 million instructions per second.

In addition to supporting both parallel processing and multiple-processor operations, the 6400 is said to be expandable linearly. According to Elxsi, two CPUs working in concert offer twice the power of just one machine — a capability most conventionally designed mainframes lack.

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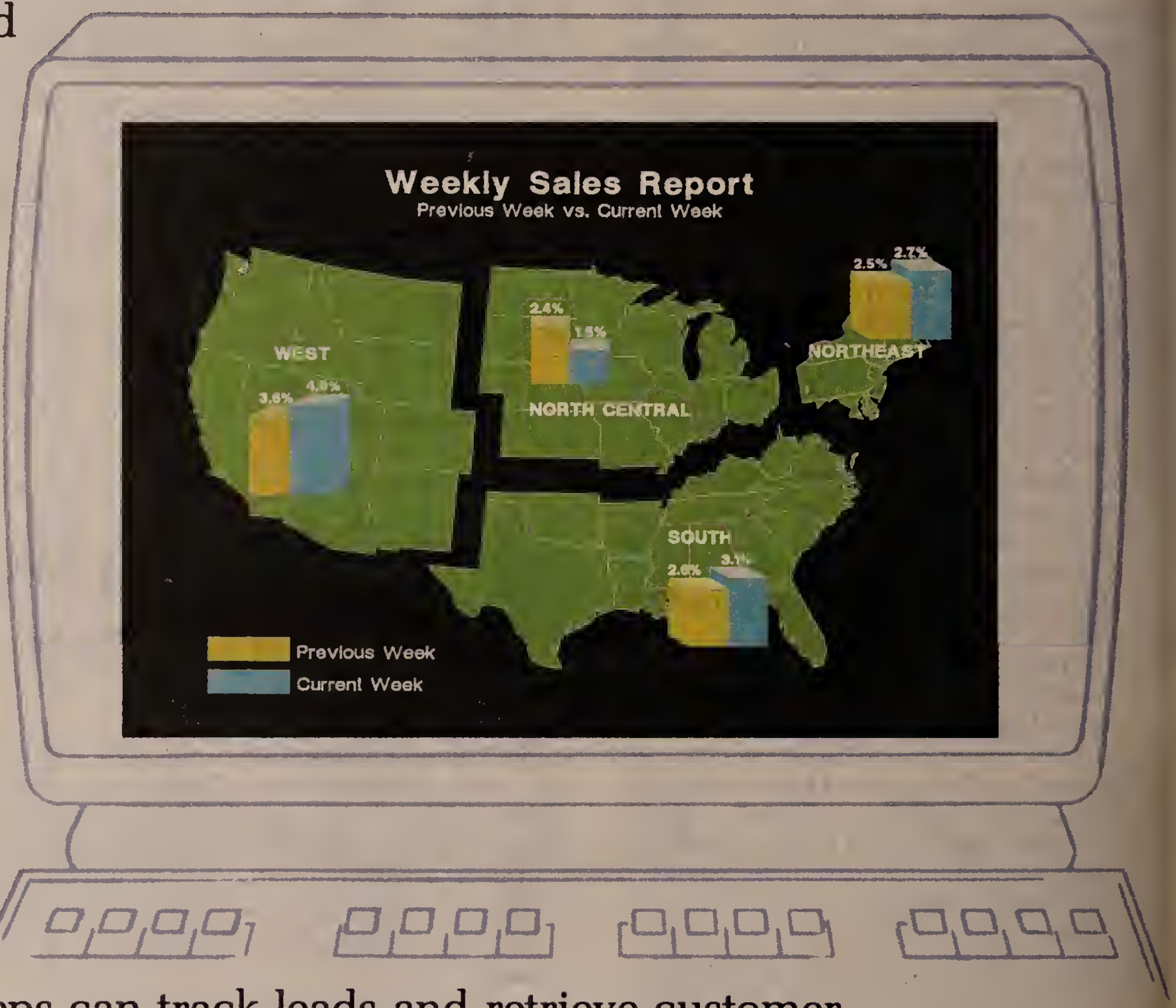

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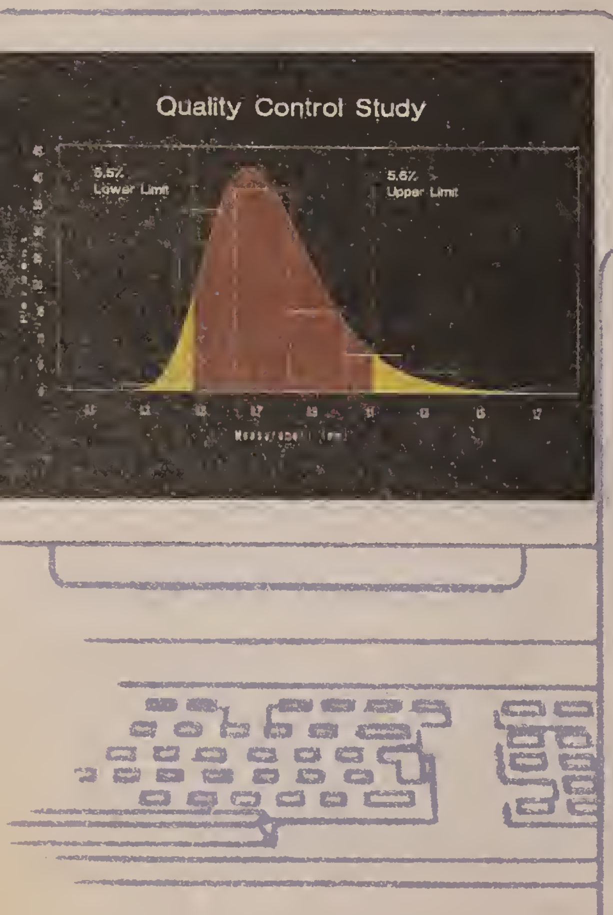

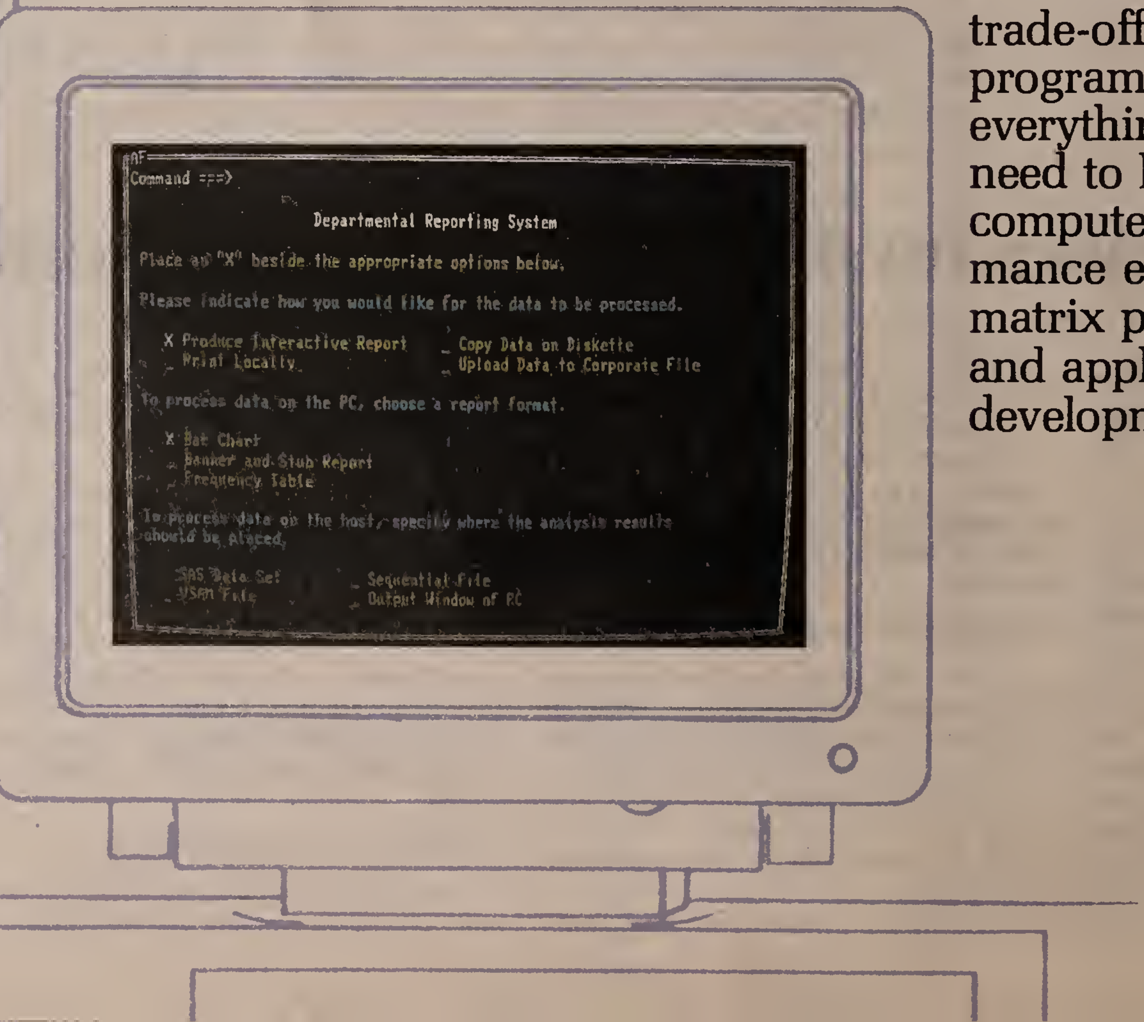

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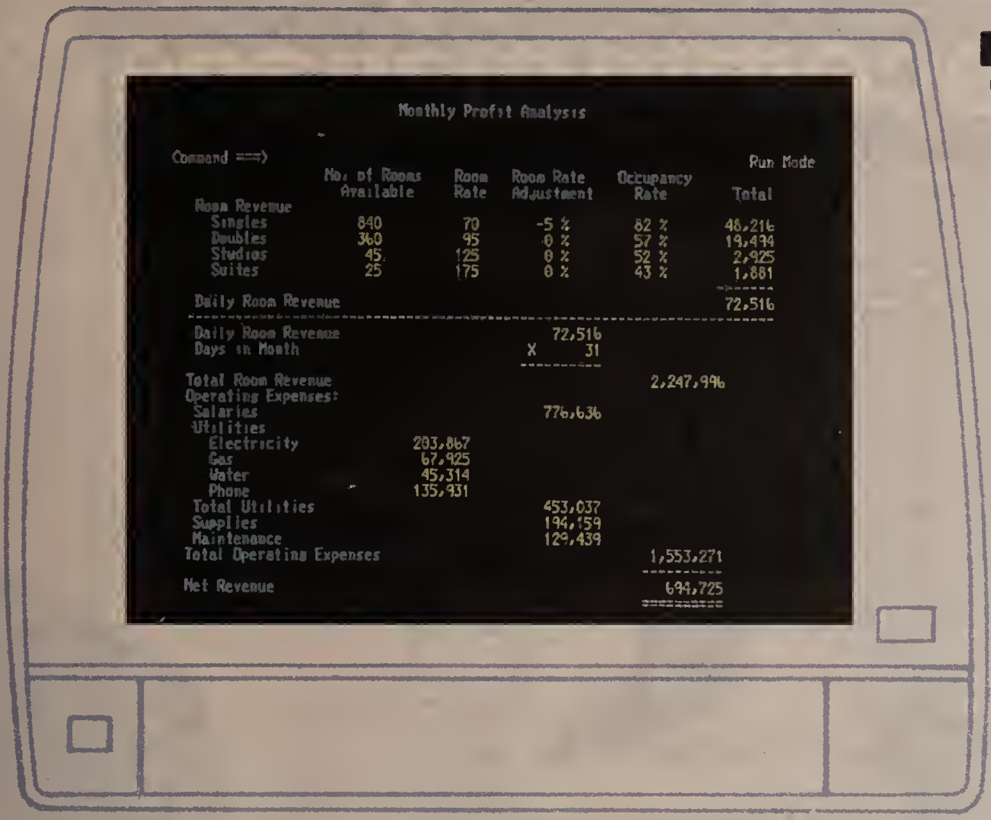
should be placed.

   SAS Data Set             _ Sequential File
  _ VSAM File               _ Output Window of PC
```

SYSTEM



```
                         Monthly Profit Analysis

Command ===>                                                          Run Mode
                    No. of Rooms    Room   Room Rate    Occupancy
                     Available      Rate   Adjustment     Rate        Total
  Room Revenue
    Singles            840           70      -5 %          82 %       48,216
    Doubles            360           95       0 %          57 %       19,494
    Studios             45          125       0 %          52 %        2,925
    Suites              25          175       0 %          43 %        1,881
                                                                      ------
  Daily Room Revenue                                                  72,516
  --------------------------------------------------------------------------
  Daily Room Revenue                              72,516
  Days in Month                                X      31
                                               ---------
 Total Room Revenue                                          2,247,996
 Operating Expenses:
  Salaries                                        776,636
  Utilities
    Electricity               203,867
    Gas                        67,925
    Water                      45,314
    Phone                     135,931
  Total Utilities                                 453,037
  Supplies                                        194,159
  Maintenance                                     129,439
 Total Operating Expenses                                    1,553,271
                                                             ---------
 Net Revenue                                                   694,725
                                                             =========
```

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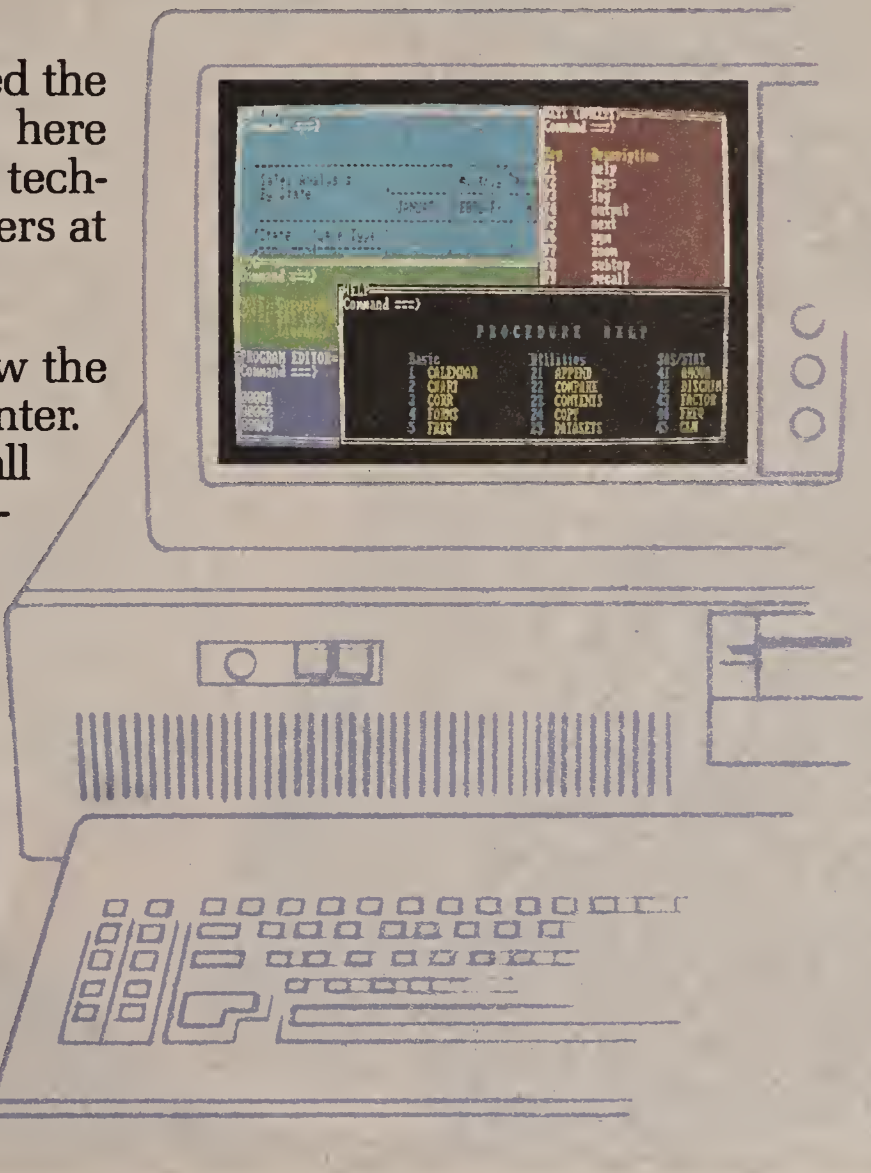

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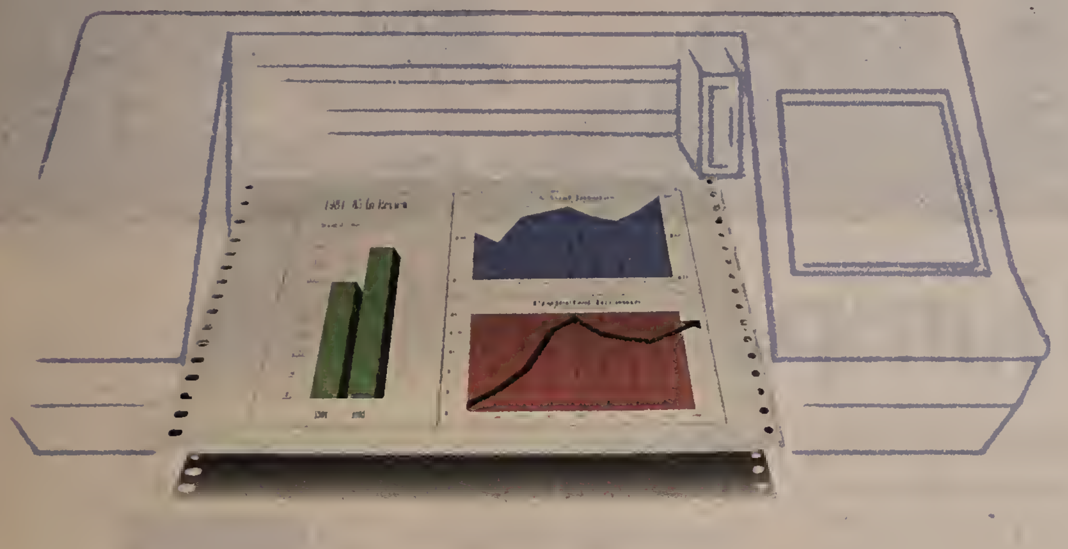

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INFOTRON SYSTEMS

Prime offers graphics terminal, enhanced Medusa software

Tektronix-based PGT 4111 features 16 available colors

By Rosemary Hamilton

NATICK, Mass. — Prime Computer, Inc. recently introduced a graphics terminal that is said to have similar functionality to its high-end graphics terminal at half the price.

The company also released a new version of its Prime Medusa computer-aided design and engineering software. Both products are available now.

The PGT 4111, Prime's third Tektronix, Inc.-based terminal, sells for $12,950, compared with the starting price of $25,750 for the PGT 4125.

Displays 16 colors

The PGT 4111 displays 16 colors, compared with the 256 colors available in the PGT 4125. The PGT 4111 was designed to work with Prime's Series 50 minicomputers.

The terminal supports Prime's Medusa software for two-dimensional and three-dimensional design, including the latest version, Revision 3.

The new version consists of four new modules and added features, including one module for an interactive shading process and three modules that provide interfaces to third-party design packages.

Creating shades

The Interactive Shaded Viewer module that lessens the steps involved to create different shades costs $6,000 for use on Prime's office systems, the 2350, 2450 and 2655, and $9,000 for the company's larger systems, the 9655, 9750 and 9955.

Each interface to third-party software packages costs $3,000 for use on Prime office systems and $5,000 for use on larger systems.

The software packages include the PDA Engineering, Inc. Patran-G, the West German firm Ikross Femgem finite element analysis tools and the Ford Motor Co. Product Design Graphics System.

Module prices

The module prices are in addition to the base price of Prime Medusa, which costs $20,000 for office systems and $35,000 for larger systems.

The company also added an interface that tightly couples the design software with Prime's operating system, Primos, a spokeswoman said.

The PGT 4111 is based on a 19-in. color raster scan display screen with a 1,024- by 768-pixel resolution, compared with the 4125, which provides 1,280- by 1,024-pixel resolution.

IBM 1M-byte units replace Series/1 line

By James Connolly

RYE BROOK, N.Y. — IBM upgraded the minimum memory of its Series/1 4956 processors by replacing four models that offered 256K bytes or 512K bytes with 1M-byte versions.

The company said the 1M-byte versions cost the same as earlier versions and that no changes other than memory capacities were made in the modular, communications-oriented systems. The new configurations will allow some models to use up to 2M bytes of memory. Models B00, E00, 60D and E60 are being replaced by the Models B10, E10, 61D and E70.

The prices for the new units range from $12,500 for a 1M-byte, 13-slot, full-rack B10 to $20,500 for a 1M-byte, six-slot E70 with a 60M-byte disk drive. IBM said existing orders for the older models will be upgraded to the new versions without charge and that memory upgrades for installed systems cost $3,500.

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Sperry inks deals to sell optical storage units

Agreements with Filenet, Hitachi

By James Connolly

BLUE BELL, Pa. — Sperry Corp. has announced two deals under which the company will sell optical disk-based storage systems, one an image-processing system and the other a mainframe storage subsystem.

Sperry and Filenet Corp. recently signed a remarketing agreement under which Sperry will sell and support Filenet's document image processor system, a jukebox-style optical disk storage device.

Sperry said it is also offering the first product of a marketing agreement with Hitachi Ltd. under which Sperry will sell a Hitachi-made optical system for use with Sperry's Series 1100 computers.

The systems will not compete with each other because the Hitachi device will operate as a Series 1100 peripheral — working with magnetic storage devices — and not as an image processor, according to Sperry officials.

Filenet previously distributed its system through direct sales offices in the U.S. and internationally through Ing C. Olivetti & Co.

Targeting industries

Sperry said it will sell the image processor in industries served by its National Accounts Division, including the U.S. energy field, communications, airlines, trucking and scientific and engineering industries. Filenet will sell the system in other markets.

The Filenet system is an integrated system that was designed to allow paper-intensive departments of large organizations to store and retrieve document images and to replace the flow of paper with a flow of electronic images.

Sperry officials said an entry-level Filenet configuration will cost about $300,000 and that a typical configuration supporting 12 workstations will be priced at $500,000.

The Hitachi device has a capacity of more than 2.6G bytes per platter and allows data to be written once and read many times either randomly or sequentially. That on-line system will be available during the second quarter of this year in two versions that use the Model 5071 optical disk controller and the same software — the Model 8564 library mechanism and the Model 8562 manual unit.

The 5071 controller costs $36,000 for single control and $62,700 for dual control. The library unit costs $110,400 with a single drive and $135,960 with a second drive.

A single-drive 8562 costs $50,400, and a four-drive system costs $127,080. The charge for the basic software is $11,600 and is $3,229 for optical random read software.

3M laser film plotter said to speed CAD

By James Connolly

ST. PAUL, Minn. — 3M Corp.'s Engineering Systems Division has announced a laser film plotter designed to speed distribution of computer-aided design (CAD) drawings to remote locations.

The Model 2900 CAD film plotter takes digital information about an on-screen design from a workstation and produces a 35mm aperture card with the design on film and identification data punched on the card. The card can then be mailed or hand-carried to a remote site, 3M officials said.

The system has the potential to replace some plotters and processor cameras, including 3M's own 2800 processor camera, in some businesses, a 3M spokesman said. The punched aperture cards with the attached 35mm slide can be processed in sorters and duplicators.

The system reportedly allows a typical C-size drawing to be imaged, punched and printed in less than two minutes, compared with the several hours or days that the process currently requires.

The Model 2900's dimensions are 38 in. by 56 in. by 24.5 in. The system will be available in September for $65,000 to $75,000.

Data Access designs, markets own terminal

By Alan Alper

BLACKWOOD, N.J. — Data Access Systems, Inc., a national distributor of computer products and services, introduced the first product that it designed and is selling under its own label. The unit emulates Burroughs Corp. and Visual Technology Corp. terminals.

Although Data Access has for years developed products marketed under other firms' logos, the AT1183 represents the first time the firm is marketing a terminal under its own name, noted Jim Taylor, product support supervisor. The AT1183 is being marketed through Data Access' network of resellers and via its direct sales force to end users.

At $1,495, the terminal, according to Data Access, is the only 132-col. display in the Burroughs-compatible market. The unit's 9-in. by 12-in. footprint makes it the smallest terminal emulator available to Burroughs' users, the firm added.

The AT1183 features eight host- or user-defined password-protected functions; 4K bytes of user-programmable and nonvolatile memory; autokeyboard lock, with a programmable timer for up to 255 minutes of inactivity and four independent pollable screen addresses with four independent display buffers.

Available from stock, the AT1183 is also being offered with a protocol converter that enables the terminal to operate in an IBM 3278/3178 environment. Price of the protocol converter can range from $1,000 to $26,000, Taylor said, depending on how much work the individual customer requires.

A tough act to follow

From page 19

stay or has had to stay with reel-to-reel technology, even if the 3422 is to run alongside a 3480.

Now, the 3480 has moved to the head of class. However, the nature of high technology may limit its reign.

The 3480 has been available for little more than a year. It is still in its vanilla form, lacking an autoload feature that analysts say could appear at any time.

PCM competition

The unit has also yet to see any competition from plug-compatible manufacturers (PCM), several of which claim they will have better products out within a year.

The expected migration of the 3480 to smaller systems is still in the development stage, and users are still trying to figure out whether they want to transfer thousands of 3420 reels of data onto 3480 cartridges.

But other vendors are already promoting alternatives to the 3480, ranging from interim systems such as Memorex Corp.'s 6520 tape caching processor to next-generation products such as optical disk storage systems like the 2.6G-byte system made by Hitachi Ltd. and offered in the U.S. by Sperry Corp.

With optical disk technology (a technology some skeptics thought would never reach the data center) already knocking on the door, and technologies yet to be imagined likely to develop, it may be impossible for the 3480 ever to match the 3420's 16-year dynasty. At today's technological pace, we could see two or three new kings of the mass-storage market before the year 2000.

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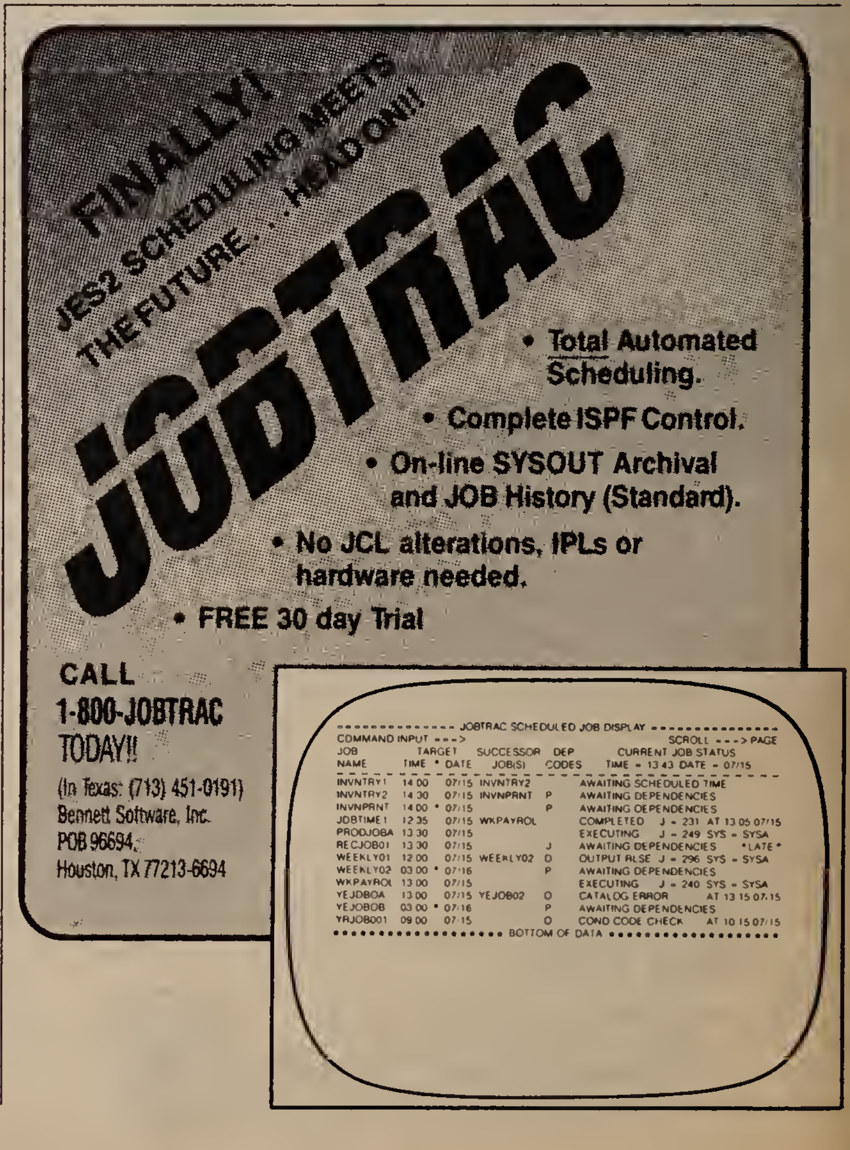

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COMMAND INPUT --->                                SCROLL ---> PAGE
JOB         TARGET     SUCCESSOR  DEP        CURRENT JOB STATUS
NAME      TIME * DATE    JOB(S)   CODES   TIME = 13 43 DATE = 07/15
-----------------------------------------------------------------
INVNTRY1  14 00   07/15 INVNTRY2        AWAITING SCHEDULED TIME
INVNTRY2  14 30   07/15 INVNPRNT   P    AWAITING DEPENDENCIES
INVNPRNT  14 00 * 07/15            P    AWAITING DEPENDENCIES
JOBTIME1  12 35   07/15 WKPAYROL        COMPLETED   J = 231  AT 13 05 07/15
PRODJOBA  13 30   07/15                 EXECUTING   J = 249 SYS = SYSA
RECJOB01  13 30   07/15            J    AWAITING DEPENDENCIES      *LATE*
WEEKLY01  12 00   07/15 WEEKLY02   O    OUTPUT RLSE J = 296 SYS = SYSA
WEEKLY02  03 00 * 07/16            P    AWAITING DEPENDENCIES
WKPAYROL  13 00   07/15                 EXECUTING   J = 240 SYS = SYSA
YEJOBOA   13 00   07/15 YEJOB02    O    CATALOG ERROR       AT 13 15 07/15
YEJOBOB   03 00 * 07/16            P    AWAITING DEPENDENCIES
YRJOB001  09 00   07/15            O    COND CODE CHECK     AT 10 15 07/15
******************** BOTTOM OF DATA ********************
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COMMUNICATIONS

WIRE TAP
Daniel Minoli

Packet-switch perspective

Judging by the flood of sales, marketing and technical discussions, one might think that packet switching is pervasive and ubiquitous. This column tries to put the long-distance data transmission technology in perspective and to raise some issues potential users should examine before committing themselves to a packet-switching system or service.

First of all, packet switching is far from ubiquitous. 1985 revenues for the top 10 U.S. packet-switching service companies only came to $250 million, compared with the $14 billion overall U.S. communications expenditures for the year.

The technology is excellent for a *narrow* set of communications requirements: highly dispersed, low traffic and bursty, asynchronous data streams. But it is problematic for synchronous traffic, for transfer of files and graphics data and for digitized voice.

There are also problems that the packet-switching industry is gradually solving. One has to do with transmission delays that arise because packets typically have a minimum length of 128, 256 or 512 characters. This arrangement means a packet cannot be sent until enough characters accumulate. A packet is like a bus that waits to be full before it departs; clearly a taxicab would be faster because it can leave with only one or two passengers.

See **PACKET** page 27

Minoli is a lecturer with New York University's Information Technology Institute as well as a full-time data communications researcher and strategic planner.

Ohio Bell packet service out

Local phone firms offer extras as regulations ease

By Stanley Gibson

Traveling a path that other divested Bell operating companies may soon follow, Ohio Bell announced last week it will offer packet switching to its business customers. Ohio Bell is the first Ameritech company and the third former Bell telephone unit to offer the service, which will be available in the Ohio service areas of Cleveland, Columbus, Dayton, Toledo and Akron/Canton.

Southern New England Telephone Co. and New Jersey Telephone Co. are already offering the service.

Packet switching enables users to replace several dedicated private lines with one packet-switched transmission path. Instead of paying a fixed monthly charge for dedicated lines, customers pay for a packet-switched line according to use.

Federal and local regulations barring other telephone companies from the packet-switching arena will soon be lifted, said Joaquin Gonzales, an analyst with Stamford, Conn., research company the Gartner Group, Inc. "Within 18 months, you will have packet switching operated by phone companies in every Local Access and Transport Area [LATA]."

Regulators and packet-switching service vendors like GTE Telenet Communications Corp. have expressed fears that the regional phone companies might maintain artificially low prices for packet switching by using telephone revenues to subsidize the services. The divested Bell companies "should keep their data transmission and telephone operations separate, or we're at a disadvantage," GTE Telenet President J. David Hann said during a recent interview [CW, March 24].

According to Gonzales, different state regulatory agencies are making independent decisions on the issue. The Public Utilities Commission of Ohio has already approved the tariff for Ohio Bell's packet-

See **SWITCHING** page 26

SNADS, MCI gateways extend reach of IBM's electronic mail

By Elisabeth Horwitt

KING OF PRUSSIA, Pa. — Addressing the needs of IBM users that want to communicate with other systems in other locations, Soft-Switch, Inc. recently announced Mailbridge Server/MCI and the SNADS Gateway family of products.

The Mailbridge Server/MCI, IBM mainframe software priced at $10,000, provides transparent connectivity to the MCI Communications Corp.'s MCI Mail electronic mail service. It works in conjunction with Soft-Switch's other Mailbridge servers supporting Digital Equipment Corp. All-in-One and Decmail, Wang Laboratories, Inc. Mailway and IBM Professional Office System (Profs) and Distributed Office Support System (Disoss) document distribution systems. All servers except for Mailbridge Server/MCI cost $15,000.

Mailbridge Server/MCI users can send documents to MCI Mail subscribers and also use MCI's links to Compuserv, Inc.'s Compuserv Mail and to 1.6 million telex users. Incoming MCI Mail messages are automatically stored in the user's local electronic mailbox.

Last week MCI announced that it would market its own version of the Soft-Switch product, MCI Link, a $10,000 software package that links users of the Profs electronic mail system with MCI Mail. "The virtue of our system is its simplicity," MCI spokesman William Stern said. "You don't need to change anything on your system. Our product is specialized; Soft-Switch's is more general."

"It's a very smart move for both companies," said Walter E. Ulrich, president of

See **GATEWAYS** page 26

NEW THIS WEEK

- Pictel offers a videophone voice/data system
- For more on this and other new products, see pp. 73-83.

INSTANT ANALYSIS

"We have no acquisition plans for any computer company."
— James Olson, AT&T president, speaking at last week's Interface '86

XA LAUNCHES DRIVE TO ACQUIRE MAINFRAME SOFTWARE PRODUCTS

MARC FEY
President, XA Systems

Los Gatos, CA, March 29, 1986—XA Systems Corp., supplier of software for IBM mainframes, announced a new corporate effort to develop alliances with independent producers of programmer productivity software.

The alliance program is intended to augment XA Systems' Xpert Series of software with products that run under MVS or VM and are designed for use by application developers.

"XA's nationwide network of sales and support offices represents an exceptional opportunity for a software developer who wants to bring a product to market," said Marc Fey, president of XA Systems. "The enthusiastic market reception to our Data-Xpert and IMS-Xpert products emphasized the real need for quality development center software. We intend to meet this need by conducting the alliance program in parallel with our own in-house product development. In this way we can leverage our resources while meeting the demands of our growing MVS customer base."

XA Systems' programming staff will work with the developer to perform quality assurance testing and to modify or extend the product and its documentation.

The successful release and wide acceptance of the Xpert series of products has established XA as the recognized leader among suppliers of development center software. Interested parties should contact XA's Ms. Robertson at 408-395-1800 for additional information about the Alliance Program.

PRODUCT FOR EDITING VSAM AND IMS DATA UNDER ISPF

Los Gatos, CA, March 29, 1986—XA Systems, supplier of application development software for the IBM mainframe environment, announced today major VSAM extensions to their Data-Xpert software product. Among the extensions is a VSAM file allocate and delete facility which operates like the familiar non-VSAM dataset utilities. Both Data-Xpert and IMS-Xpert make it easy for application programmers to work with their data from TSO/ISPF.

At Signetics, a user of Data-Xpert commented, "XA's Data-Xpert handles all the data manipulation problems that our application developers deal with and it's efficient and easy to use." Tom McHugh, XA Systems vice president of marketing and sales went on to explain that XA's products put the power to edit, extract, reformat, or print all major MVS files and IMS databases in the hands of application programmers.

Interested parties should call XA Systems at 408-395-1800 for additional information about Data-Xpert or IMS-Xpert.

Gateways extend E-mail

From page 25

Walter Ulrich Consulting of Houston. "MCI has stated that it would like to be a carrier's carrier, connecting with everybody's electronic mail system," Ulrich said. "Linking up with Compuserv was a move in that direction. Now, MCI can tap into Soft-Switch's broad base of IBM installations," he added.

"And the link with MCI enables Soft-Switch, already a leader in document translation, to move further into document distribution," Ulrich said.

According to Soft-Switch's Chairman and Chief Executive Officer Michael Zisman, SNADS Gateway represents the first time a third party has implemented IBM's System Network Architecture Distributed Services (SNADS) on any machine.

He added that the SNADS Gateway is a "more robust product" than Soft-Switch's Disoss server. "I wouldn't be surprised if it improved throughput by an order of magnitude."

Permits document exchange

The SNADS Gateway works with Soft-Switch's other communications products to enable non-IBM users to exchange documents with IBM systems on Disoss.

"And they don't have to use the IBM Document Interchange Architecture interface, which many people dislike," Zisman said. "Wang users still see Wang Office, DEC users see All-in-One and so on."

"Soft-Switch is offering a valuable service by linking up a wide range of document generation and distribution systems," Ulrich said.

"In a recent study we did, 40% of respondents recognized a need for revisable-form document interchange between incompatible systems.

"We probed deeper and found that over 90% really needed it — it was just that some companies hadn't identified the need," Ulrich added.

SNADS Gateway costs $35,000.

Both the Mailbridge Server/MCI and the SNADS Gateway run on IBM System/370 mainframes or compatibles supporting MVS or MVS/XA.

Switching service out

From page 25

switching service, which is called the Ameritech Packet Switched Network.

At this point, Ohio Bell's packet-switching service is intra-LATA.

Gonzales said that most of the income the regional phone companies will derive from the packet-switching service will come from connecting customers to the main packet-switching providers in much the same way that local telephone companies derive much of their income from connecting users to long-distance telephone service providers.

Users may link up with the Ohio network through dial-up circuits at up to 1,200 bit/sec. or through dedicated circuits at rates of up to 56K bit/sec. Ohio Bell has installed Northern Telecom, Inc. SL-10 packet-switching nodes and remote equipment in Cleveland, Columbus, Dayton, Toledo and Akron.

> *'Within 18 months, you will have packet switching operated by phone companies in every LATA.'*
>
> — Joaquin Gonzales
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Packet-switch perspective

From page 25

The solution would be to make the packets smaller, but this increases overhead due to framing and addressing characters needed in each packet. As wideband facilities become more available, this overhead becomes an acceptable trade-off.

Packet-switching transmission speeds are also limited by switch and line capacities. Even the larger packet-switching systems have a throughput of only 1K to 10K packet/sec. And outgoing trunks can only carry up to 56K bit/sec. Development efforts are under way to raise the throughput to 1M to 2M packet/sec.

Another packet switching issue that bears watching is the evolution of standards. In the past, different vendors have implemented inconsistent variations of X.25, the CCITT-developed asynchronous packet-switching standard. Recently, U.S. companies have agreed on a version of 3270 Display System Protocol, a standard for IBM 3270 bisynchronous access to packet-switching networks, but there is no equivalent standard for IBM Systems Network Architecture devices.

Until recently, users of packet-switching services have suffered from the fact that packet-switching protocols guaranteed delivery and data integrity between packet assembler/disassembler nodes but not between a node and the "last mile" to the terminals. Communications protocols such as the CCITT X.32, the Microcom, Inc. Microcom Networking Protocol and Tymnet/McDonnell Douglas Network System Co.'s X.PC offer a partial solution to this problem.

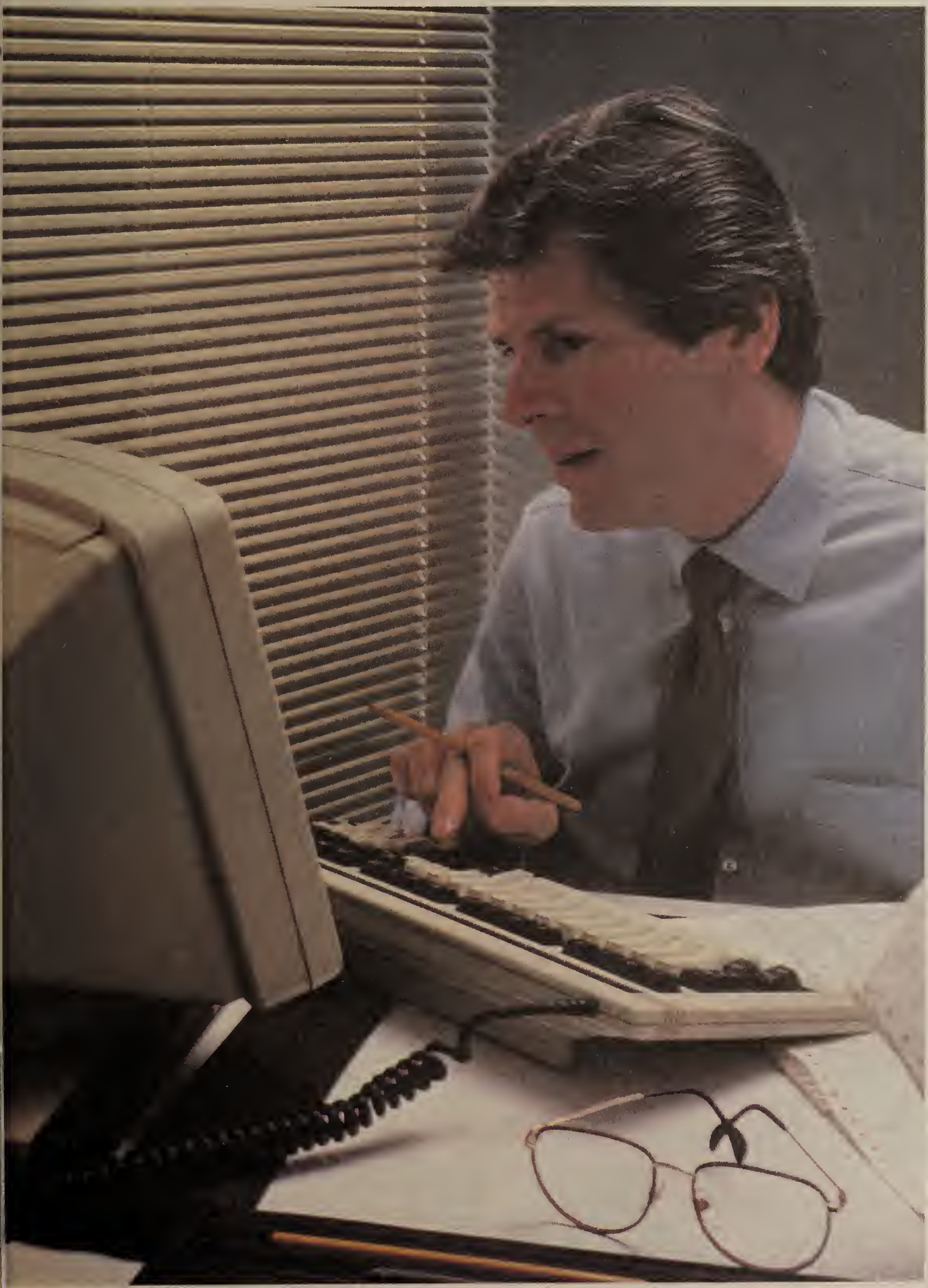
From a cost-justification standpoint, the desirability of using a packet-switching service depends on the application. For example, suppose a business needs to send 100 separate transactions of 1,000 characters each, such as point-of-sale credit card authorizations. The total dial-up cost, even using state-of-the-art 10K bit/sec. dial-up modems, would be $50 because of phone companies' one-minute minimum charge per call. In contrast, total costs using Tymnet's 9.6K bit/sec. packet-switching service would come to around $4.

On the other hand, suppose someone needed to transmit one 300K bit/sec. file (one floppy) across the country. Using a 10K bit/sec. modem over a direct-distance dial line, the transaction would require 240 seconds, costing approximately $2. Tymnet, in contrast, would charge $3 per hour for access, plus 4 cents per thousand characters. Total cost: $12.20.

> ”
>
> ***A packet is like a bus that waits to be full before it departs; clearly a taxicab would be faster because it can leave with only one or two passengers.***

Using packet-switching services to transmit over distance also has its drawbacks. Packet tariffs are "postalized" so that the same charge is ascribed to the user whether the packet is moved across town or across the U.S. It actually costs a service more to send a packet over distance, so users who send locally end up subsidizing the long-distance users. The only way this unfair practice will cease is if customers begin to complain.

Technical improvements in packet-switching and trunking interfaces, along with emerging standards such as the Integrated Services Digital Network and International Standards Organization's Open Systems Interconnect, should make the packet-switching option much more attractive in the next few years.



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SOFTWARE & SERVICES

Tandem will share SNAX with LU6.2

By Jeffry Beeler

CUPERTINO, Calif. — Tandem Computers, Inc. last week joined the trend to interconnect with IBM's LU6.2 protocols by announcing an extension to its Systems Network Architecture Communications Services (SNAX), which allows Tandem's Nonstop products to communicate with SNA-compatible equipment.

In a related announcement, the supplier of on-line transaction processing systems also released an upgraded version of its SNAX/High-Level Support (SNAX/HLS) software, which provides a high-level interface that enables applications to communicate with SNA products.

Tandem's ability to support LU6.2 is implemented in SNAX/Advanced Program Communications (SNAX/APC). By adding an LU6.2 capability to its existing SNAX product, Tandem has given its Nonstop systems a common protocol that allows them to communicate on a program-to-program basis with other vendors' office devices, according to Roger Mathews, Tandem's SNAX product line manager.

Previously, Tandem systems could accomplish the same feat only by supporting a number of protocols and by maintaining a master-slave relationship between the mainframe and smaller, distributed products.

Now, however, "Tandem's systems can have PCs below them on a network and IBM mainframes above them, and they can all talk to each other through the same protocols," Mathews said. He claimed the function will make it easier for users to develop applications "because the user only has to deal with one set of programming rules instead of several."

In the SNA world, the only major exceptions to Mathews' performance claims are systems running under IMS, which IBM has yet to enhance to support LU6.2. Tandem users who want to communicate over SNA with IMS-based systems will have to continue doing so through an alternative

See **TANDEM** page 30

Uncle Sam's upkeep woes

Maintenance problems continue; suggestions meet apathy, resistance

Government's software maintenance problems

Cost: Software maintenance consumes 50% to 80% of the government DP staff budget.

Management: Upper level management does not view maintenance as a separate function to be managed or evaluated.

Techniques and tools: There are relatively few standards, methodologies or tools for use in software maintenance.

Personnel: It is difficult to hire, train, motivate and retain maintenance programmers.

Legacy of development: Software turned over to those who maintain it is often poorly designed, poorly implemented and poorly documented.

Information provided by the National Bureau of Standard's "Software Maintenance Management"

MITCHELL J. HAYES

By Mitch Betts

WASHINGTON, D.C. — Just as it is in the private sector, software maintenance at federal agencies is generally undermanaged, understaffed and underappreciated, but there are some faint signs that this situation is changing, according to software experts at the National Bureau of Standards (NBS) and the U.S. General Services Administration (GSA).

NBS, for example, published a popular software maintenance guide and organized the Federal Software Maintenance Group to help managers share solutions to their maintenance problems. GSA, meanwhile, has been promoting its software maintenance and conversion services, including a "programmer's workbench" of software productivity tools.

Government interest in software maintenance — particularly from the DP management troika of GSA, the NBS Institute for Computer Sciences and Technology (ICST) and the president's Office of Man-

See **UNCLE** page 31

IBM enhances data facility line

By Rosemary Hamilton

RYE BROOK, N.Y. — IBM recently announced enhancements to four of its storage management software programs that are part of its data facility family running under the MVS/XA operating system.

The programs were first introduced in February 1985, and the recent batch of enhancements make them more tightly integrated, according to IBM.

The MVS/XA Data Facility Product (DFP) Version 2 Release 2 was designed to manage active data. It now includes IBM's ISMF, which allows users to access functions of the three other storage programs in a transparent manner, according to IBM. The DFP Version 2 Release 2 has a monthly license fee of $1,025.

The second program, the Data Facility Hierarchical Storage Manager (DFHSM) Version 2, Release 2.1, which was designed to help manage inactive data, can now be invoked through ISMF. In addition, it now supports IBM's new release of its data base management software DB2, an IBM spokesman said. DFHSM has a monthly license fee of $800.

Third, the Data Facility Data Set Services (DFDSS) Version 2, Release 2, which provides for the copying of data bases between unlike devices, now has the ability to restore data from dump tapes to unlike devices. As with DFHSM, users can invoke

See **IBM** page 31

INSIDE

A division of Sterling Software introduces an interface to Cullinet's IDMS/R/**30**

INSTANT ANALYSIS

'LU6.2 is the strategic direction for integrating distributed transaction processing systems.'

— Dennis McEvoy, vice-president of software development, Tandem Computers, Inc.

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Dylakor's IDMS/R interface out

By Eddy Goldberg

GRANADA HILLS, Calif. — The Dylakor Division of Sterling Software recently introduced DYL-IDMS/R, an interface module that connects its DYL-280 and DYL-280 II information and file management system for IBM mainframes to Cullinet Software, Inc.'s IDMS/R relational data base management system.

The full-function interface allows DYL-280 and DYL-280 II users to retrieve and update conventional records, Logical Record Facility records and IDMS/R table entries from IDMS data bases. It also provides access to IDMS' integrated data dictionaries.

The interface product uses both DYL-280 commands and the same commands used in Cullinet's Cobol Data Manipulation Language. Dylakor President Carole Morton said that users familiar with IDMS Cobol commands will have no trouble using DYL 280.

The MVS version of DYL-IDMS/R is available for $8,690 to customers who own DYL-280 or DYL-280 II. A VSE version is expected later this year.

Dylakor also announced that new releases of DYL-280 (5.1) and DYL-280 II (2.1) contain a feature called Vfile. This feature allows users of DYL-Vlink, the company's micro-to-mainframe connection, to extract mainframe information and transfer it to virtual disk files that can be accessed by a network of personal computer users.

DYL-Vlink, a transparent line to mainframe-resident virtual disks, allows personal computer users to access and control public or personal virtual disk files with common IBM PC-DOS and Microsoft Corp. MS-DOS commands. A site license for five micro users costs $6,200.

Morton said that Vfile can be used by information center coordinators to provide PC users with access to sensitive corporate data without fear of compromising data integrity or security. Only the data in the virtual file is accessible to authorized users.

Other enhancements to DYL-280 and DYL 280-II include an expanded compiler for compiling larger programs, a new Quit command that enables programmers immediately to terminate programs and a feature that allows File statements to be put anywhere in a program.

DYL-280 Release 5.1 is priced at $11,000 and DYL-280 II Release 2.1 at $15,000 for OS and DOS versions.

Tandem goes to LU6.2

From page 29

protocol — Secondary Logical Unit Type P, Mathews said.

In addition to supporting LU6.2, SNAX/APC provides a high-level interface and other tools that "make the product very easy for programmers to use and shield them from having to know a lot about SNA," Mathews added. "Programmers don't have to worry about the chaining and packaging of data because those kinds of functions are done by the product automatically."

For Tandem's Nonstop EXT processors, SNAX/APC is available for a $1,000 one-time license fee and a $240-per-month maintenance charge. For the Nonstop II and TXP systems, the price includes a $6,000 initial license fee and $600 in monthly maintenance expenses.

As part of the latest SNAX/HLS release, Tandem has added support for a proprietary protocol, Federal Link Access for Secondary Half Sessions, which permits financial institutions to communicate with the Federal Reserve's network.

In the past, banks that needed to exchange information with the Federal Reserve system had to write their own communications code and maintain it themselves. But with the enhanced version of SNAX/HLS, Tandem will take over the maintenance.

The revised release of SNAX/HLS also includes an enhancement that "increases the degree to which applications can control data flow in a network," Mathews said.

The latest release of SNAX/HLS costs $5,000 for a one-time license fee and includes a $600-per-month maintenance charge.

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Uncle Sam's upkeep woes

From page 29

agement and Budget (OMB) — has been growing for the last three or four years, according to Roger J. Martin, manager of the software engineering group at ICST.

Martin says the interest was triggered by a 1980 report by the General Accounting Office titled, "Federal Agencies' Maintenance of Computer Programs: Expensive and Undermanaged."

More recently, an NBS survey found a familiar litany of problems at federal agencies, including management inattention to maintenance, the relative lack of maintenance methodologies and tools (compared with those available for software development) and the difficulties of keeping trained maintenance programmers.

Six years after the congressional report, software maintenance still suffers from neglect, according to Richard G. Harrison, director of GSA's Federal Software Management Support Center. "I just can't get over the amount of emphasis that is placed on new development," he complains.

Few follow maintenance plan

"There are a few organizations that are taking the maintenance problem seriously, and by that I mean taking action that follows a maintenance plan. The rest are just seriously thinking about it. We've got pockets of excellence and pockets of resistance," Harrison says.

Some companies argue that automated maintenance tools are dehumanizing to programmers, Harrison continues. But he counters that maintenance tools eliminate the tedium of handling routine "housekeeping" duties, so maintenance programmers can concentrate their intellectual efforts on the job of problem solving.

Harrison's center, with a 22-member staff, provides software maintenance and conversion services to federal agencies on a cost-reimbursable basis, but it can reach only a small part of the vast government DP community, Harrison says. The center currently has a $25 million contract with the U.S. Navy to convert five million lines of code handling four separate homegrown data bases from Sperry Corp. Univac 494s and RCA Corp. computers to IBM processors running Cullinet Software, Inc.'s IDMS data base software, he says.

New operations getting funds

Referring to the ancient Univac and RCA processors, Harrison observes, "If government kept up with the changes in hardware and software over the last few years, most of these conversion costs would not exist. But to keep up, you need the money, which usually goes to new operations, not maintaining what's already there."

Wilma M. Osborne, ICST's project manager for software maintenance, says the key to improving the climate for software maintenance is to get high-level, nontechnical managers to understand and support it. "Unless there is management involvement, top-down pressure, software maintenance is unlikely to happen," she asserts.

Osborne says she is pleased that the Federal Software Maintenance Group meetings have attracted dozens of federal executives and that a new pocket guide on software maintenance has been popular, too. The maintenance group is also developing a slide show.

High-level executives "need to see that the existing inventory of software is valuable, and there are software tools to make it more maintainable, understandable and useful," she says.

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IBM boosts data facility

From page 29

this function through the ISMF. It costs $215 per month.

The Data Facility Sort Release 8, designed for fixed-length record sorting, has been enhanced to include variable-length record sorting, a function also invoked through the ISMF. It has a monthly fee of $247.

The new versions will be available in the third quarter, with the exception of the Data Facility Sort Release 8, which is available now.

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MICROCOMPUTERS

MICRO BITS
Thomas O'Flaherty

Lotus: Building bridges too far?

From no revenue in early 1982 to $225 million in 1985, Lotus Development Corp. has become the largest independent software vendor, overtaking a plateaued Cullinet Software, Inc.

However, more than 90% of Lotus' revenue comes from its micro productivity tools, mostly its spreadsheet-based products.

What will happen to Lotus when most people who need a spreadsheet have one? How likely is this kind of saturation? Should people who aren't Lotus employees and stockholders particularly care?

The problem for Lotus is that software, for all intents and purposes, is immortal. Unlike the case with hardware, one is never absolutely forced to throw things away and start over.

Moreover, once an application is working, a software conversion is a no-win exercise: In the year 2065 we will, no doubt, be celebrating the centenary of IBM 1401 emulation.

Coming out with new quantum leap spreadsheet products could be a dangerous solution for Lotus: New products would render old products obsolete, making current customers testy, to say the least. More important, the spreadsheet market would be reopened for Lotus' tiny competitors.

Lotus has been quite intelligent in the development of new versions such as 1-2-3 Release 2 and add-ons such as 1-2-3 Report Writer. But some users have already had difficulty in adapting to even the relatively minimal changes from old to new 1-2-3 releases. Future releases will run into further resistance to change.

So whether you look at new products or enhancements, there is not an auto-

See **LOTUS** page 34

O'Flaherty is a principal of Information Service Strategies, a Wood-Ridge, N.J.-based consulting firm.

Alpha to unwrap package

Tool uses same file format as Ashton-Tate Dbase III

By Douglas Barney

BURLINGTON, Mass. — Alpha Software Corp. is scheduled to release a new mid-range microcomputer data base, Alpha Data Base Manager III, in May, according to software experts who have viewed the product.

The package's key strength is that it uses the same file format as industry-leading Dbase III from Ashton-Tate, allowing it to read directly Dbase files and use Dbase data disks with no conversion required, said Jeffrey Tarter, publisher of "Soft-Letter," a newsletter for the microcomputer software industry. "I don't know of anything else that does that," Tarter said.

"I think they can do very well with this; it is exactly what people want," said personal computer consultant Adam Green. "It works natively with Dbase files."

Alpha officials declined to comment on the product.

Other programs, such as Microrim, Inc.'s R:Base 5000 and Ansa Software Corp.'s Paradox, require Dbase files to be converted before they can be used, making it difficult to sell these programs into corporations that have standardized on Dbase. Conversion is time consuming and can unnecessarily create two different versions of the data base.

In addition to compatibility with the Dbase data file structure, Alpha Data Manager III is compatible with Dbase NDX index files and supports Dbase functions for doing trims, substrings and sophisticated manipulation of strings. The report writer is menu driven and allows users to build detailed technical reports without programming.

The product also has conditional logic similar to Dbase that is largely geared to generating form letters. For example, an accounts receivable department could create custom form letters with different approaches based on geographical location, the amount owed or the degree of lateness of the payment.

"It looks like companies that already have Dbase as their standard will use this because it is a lot easier to use," Tarter said. "If you have got a company that is standardized on Dbase, the only people who can write applications are Dbase programmers."

Data Base Manager III is entirely menu driven but is not menu bound, allowing adept users to use English commands. For example, instead of using menus to design a report and print it, users will be able to type in "R" for report, "D" for design and "P" for print.

"With this thing, any idiot can write a very powerful application. You can get access to all of the Dbase commands, but they have cleaned up the interface. It really is beautiful to use," Tarter said.

Green predicted that it will take a day

See **ALPHA** page 34

Managers form info center group

By Eric Bender

NEW YORK — The Big Apple has finally joined the ranks of cities with an information center managers group.

The newly formed Information Centers Managers Association of New York aims to bring together managers to discuss issues and experiences. An initial meeting, held at AT&T headquarters earlier this month, drew about 50 managers.

Since the information center concept was born about nine years ago, "We've fluctuated back and forth from order to chaos countless times and confronted new issues with surprisingly regular irregularity," noted cofounders Donna Dufner of Manufacturers Hanover Trust Co. and David Phillips of Metro-North Commuter Railroad in a written statement.

"We are looking, like everybody else, for some kind of peer association," Phillips commented. Although an annual gathering of information center managers is held, he and Dufner saw a role for a local group that met more often.

According to Phillips, related groups such as the Microcomputer Managers Association were more interested in addressing administrative and technical questions, such as when to upgrade a package, than in information center managerial problems, such as how to write an end-user support contract.

The association intends to hold bimonthly meetings. Those interested in more information should contact the Productivity Center, a New York consulting and training firm.

NEW THIS WEEK

- True Basic offers Hercules graphics card support package
- For more on this and other new products, see pp. 73-83.

INSTANT ANALYSIS

"If I were looking in a crystal ball, I'd say management of information as a resource will start to be shared between data base administrators and information center people. There may be turf battles, but it's new stuff that's coming down."

— David Phillips, info center manager, Metro-North Commuter Railroad

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Lotus bridges built too far?

From page 33

matic productivity tool replacement market like those for cars or even mainframes. If anything, there is an "antireplacement" market, if you take into account the effects of illegal copying and site licensing.

So Lotus may well have future problems with its mainstream business.

Should we care? Yes, even jealous competitors have more of a stake in Lotus' success than they might imagine.

If Lotus is not a prosperous survivor, then the entire software industry will suffer. Potential customers and investors will perceive software as a much riskier investment than hitherto assumed.

Lotus is vulnerable because it has little in the way of recurring revenue. IBM, on the other hand, receives a continuing stream of income from software rentals and operating system enhancements.

Some independent mainframe software vendors get 20% to 25% of their total income from recurring services.

Certainly, expanding the 1-2-3 family makes a lot of sense, and Lotus has several million users with a disposition to buy. However, these efforts just raise the yield from the same soil — they don't open up new territory.

Lotus, of course, is aware of these potential dangers. In the last year it has undertaken a series of product enhancement and diversification efforts.

Besides its productivity tools Lotus is moving into three other families of products: micro-to-host software, financial data services and publishing.

Other offerings are promised for the next year, including engineering/science and artificial intelligence-based products.

> ❞
>
> ***The problem for Lotus is that software, for all intents and purposes, is immortal.***

A year ago, Lotus agreed with Cullinet to develop and market jointly micro-mainframe links tied to Cullinet's mainframe products.

Recently, Lotus acquired its own link product, Ilink, and terminated its relationship with Cullinet. This was a brave step, given the slow sales of micro-mainframe links generally and Lotus' unfamiliarity with the mainframe world. Can the micro tail wag the mainframe dog?

Signal is another new Lotus product born via acquisition. Signal transmits current stock quotes to special personal computer hardware and software. Lotus has also made arrangements to sell satellite dishes to those too far from the cities broadcasting Signal's signal.

In addition, Lotus bought Isys Corp., a company that supplies historical financial data, which can complement Signal's short-term data.

But Signal sales have so far been relatively weak. Will the enhancements and increased market familiarity with this innovative product produce another 1-2-3? Probably not.

Lotus Magazine has swum successfully against the ebbing tide of computer publications. But it is not clear that the magazine will be much more than a well-conceived marketing and support tool that pays its own way.

New products out of step

The interesting, and somewhat worrisome, point is how each product family is out of step in at least one respect with Lotus' mainstream tools and with each other.

- Ilink is aimed at mainframe computers and will be used by and sold to MIS professionals on a departmental basis rather than by PC users.
- Signal involves hardware as well as selling information as a service. It will also, generally speaking, be used at home.
- Publishing involves an orientation quite unlike the software businesses or financial data services.

It is hard to find many other examples of companies — even IBM — that have found the secret of selling disparate products into such a diverse collection of markets.

The attempts of independent mainframe software companies to sell micro software are not very happy precedents.

Assimilation and digestion

Lotus appears to see the immediate future as a time of assimilation and digestion. How else to explain its decision to spend at least a third of its cash hoard on buying back its own stock?

However, Lotus certainly has enough on its various plates to keep it busy for a while. It is a fair question, though, to ask whether all of Lotus' new restaurants have three stars.

Perhaps we can summarize Lotus' position by analogy: Data processing is sometimes viewed as a series of information archipelagoes that will gradually be linked. Lotus appears to be trying to colonize many of these islands.

But are they green and pleasant lands or rocky and infertile?

And given the current state of information engineering, can bridges be built between them?

Alpha micro data base due

From page 33

or two for a novice to learn.

The package is expected to cost about $300, and it may be bundled with Keyworks, a keyboard utility that allows users to create custom menus and to generate macros.

Data Base Manager III is a total rewrite of Data Base Manager II, the Integrator, a menu-driven data base introduced by Alpha three years ago that has an installed base of some 40,000 units. The new product is currently in beta test with some corporate customers.

The package runs on IBM Personal Computers and compatibles with 256K bytes of random-access memory (RAM). The product is not RAM-based, and a hard disk is recommended.

Keyworks 2 announced

In related news, Alpha has announced a new version of the $89.95 Keyworks keyboard enhancement program.

Keyworks 2 contains a cut-and-paste feature that allows the user to copy data from the screen and transfer it to other applications, files or even a printer.

The program also reportedly contains keystroke recall, a function that retains the user's last 300 keystrokes to create "after-the-fact" macros, so a user does not have to prepare in advance to create a macro.

Other new features include menu editing and the ability to set all printer parameters without leaving the application.

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Product Spotlight

Edited by Barbara Wierzbicki

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Mini and mainframe DBMS

The seven-step solution

By SHAKU ATRE

A data base management system, including data dictionary and fourth-generation language, typically costs about $333,000 for a one-time license fee. This figure, however, represents only the tip of the financial iceberg.

The major cost lies not in the system purchase price but in the cost of time — time that systems analysts, application programmers and systems programmers spend analyzing various applications to be developed, creating the applications programs and then maintaining both the applications and the DBMS.

In its first year of operation in a Fortune 400 company, a DBMS requires the attention of approximately 12 programmers, one systems analyst and a data base administrator. Salaries and fringe benefits for these personnel total $1 million. For cost reasons alone, then, the evaluation and selection of a minicomputer- or mainframe-based DBMS must be taken very seriously.

But there is another reason: DBMS and related offerings are strategic products that — if used as such — can take an organization to the leading edge of technology and performance.

Of critical importance is the immediate and ongoing involvement of the information center manager. This role is pivotal in the decision-making process since the capabilities or limitations of the DBMS on the mainframe directly affect the communications link required for accessing the production data on the mainframe from microcomputers.

Companies could avoid needless problems and expenditures by executing a well-planned DBMS strategy within a three-month time frame.

Secondly, along the lines of the domino theory, the evaluation process must involve selecting not only the DBMS, but also a data dictionary, a teleprocessing monitor, a fourth-generation language and a query and report generation language. Often, evaluators mistakenly focus all their attention on buying the DBMS, intending to select a data dictionary or fourth-generation language at a future date.

But choosing a DBMS without considering its associated satellite products reduces options. Without these integrated or satellite packages, the

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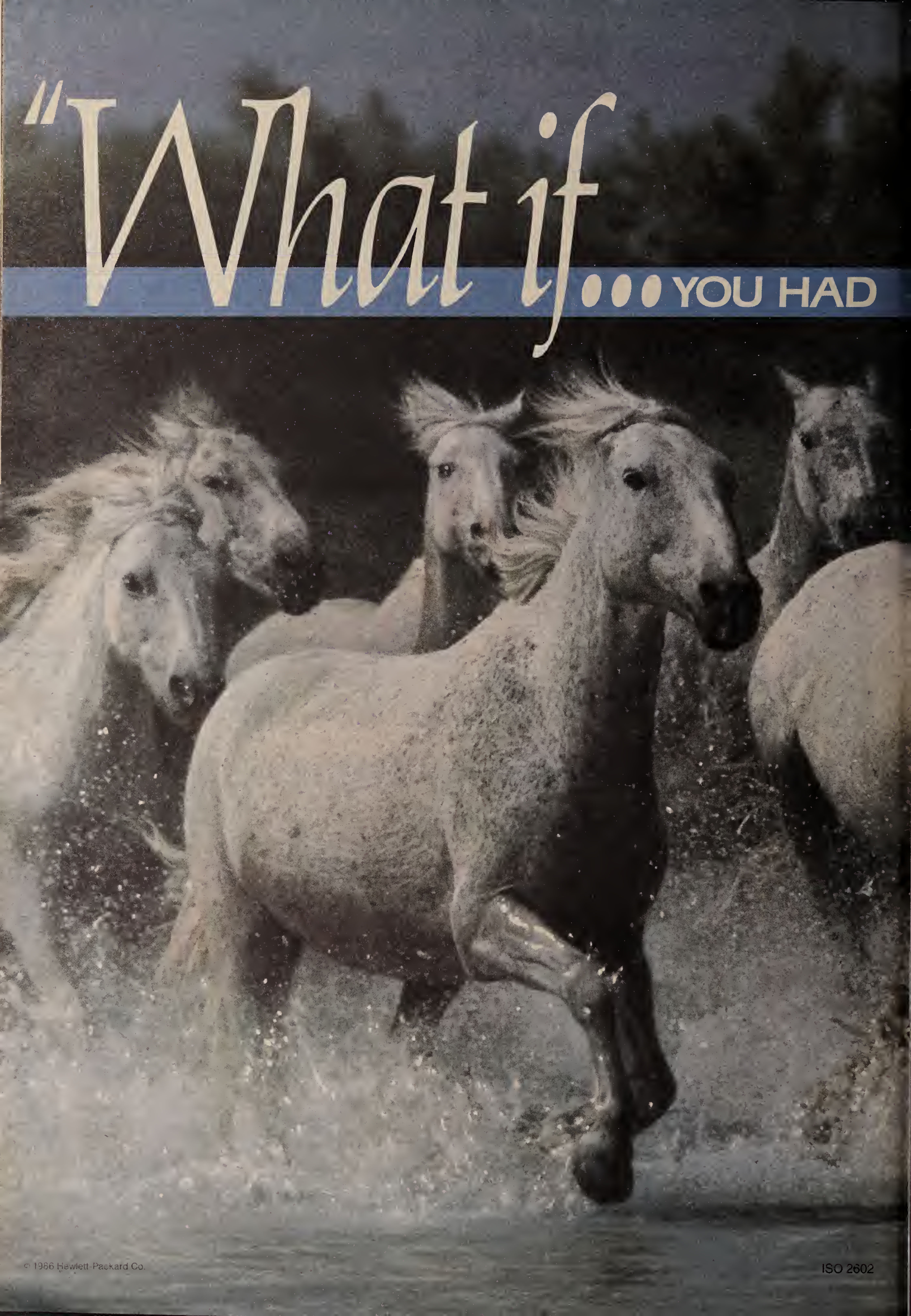
Atre is president of Atre International Consultants, Inc. of Rye, N.Y., which specializes in information center implementation and data base/data communications consulting and training. This article is based on a chapter from her forthcoming book Information Center: Strategies and Case Studies.



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Business Computing Systems

Seven steps to a DBMS solution

> ***Some DP executives think they can change vendors and/or systems if a DBMS implementation does not work the first time — not true. Conversion is like changing the tires on a running car.***

Continued from page 35

establishment of an information center makes little sense. Even if not acquired at the same time, all products should be evaluated simultaneously.

Some DP executives think they can change vendors and/or systems if a DBMS implementation does not work the first time — not true. Conversion is like changing the tires on a running car. Converting software from one system to another is extremely time-consuming and, as a result, very expensive.

In real life, conversion almost never takes place. The existing application systems continue to operate as usual, and only subsequently developed systems use the new DBMS.

Two DP experts, devoting themselves on a full-time basis, should complete the entire evaluation and selection process, as well as the implementation phase, within three months. If it takes longer, the evaluating committee members may lose interest and opt for ill-fated shortcuts, such as installing any DBMS just to be done with the project.

To select a DBMS, follow this seven-step approach:

- Identification process.
- Elimination process.
- Preparation of request for proposal.
- Response evaluation.
- User meeting.
- Final evaluation at the vendor's headquarters.
- Recommendation.

The identification process defines those applications and functions to be implemented first on the DBMS. Representatives from user management must be included as evaluating committee members because they are the ones who decide which business functions will be initially automated.

Acquiring management commitment for the succeeding evaluation, selection and implementation phases represents a major activity in the identification process. Top-level management will expect to see some quick results in the first six months. Be certain the initial application targeted for implementation on the DBMS is not so overwhelmingly large that the project cannot be completed within the six-month time frame.

T**he elimination process** disqualifies all DBMS that do not have the following characteristics:

- Compatibility with both your hardware and operating system. Upward compatibility needs to be considered, too. While the operating system used today is IBM's DOS/VSE, tomorrow it might be MVS or VM. Make certain the selected DBMS supports the upward-compatible operating system.
- Compatibility with your teleprocessing monitor (IBM's CICS and IMS/DC); the programming language used in your organization (Cobol, RPG-II, Fortran, PL/I); and existing prepackaged application software, such as payroll, accounts receivable and accounts payable.
- An easy-to-use integrated data dictionary and user-friendly utilities including report writer, ad hoc query capability and prototyping facility, such as those found in Information Builders, Inc.'s Focus or Martin Marietta Data Systems' Ramis II.

At the conclusion of the elimination process, the number of contenders ideally should not exceed six.

The preparation of a request for proposal serves as a blueprint suitable for acquisition of any software exceeding a purchase cost of $50,000 or a monthly leasing fee of $1,500. The request for proposal must first provide a detailed profile of your company's computing environment in order to establish vendor evaluation and selection criteria.

To that end, the request must define the minimal set of requirements to be met by those six vendors wishing to present products for consideration. Base these requirements on your company's current hardware and software environment, as well as specific needs determined by management to be important, such as the availability of a report writer, query package interface and application programmer productivity tools.

The following sample environment, based on Company X's computing requirements, outlines the prerequisites vendors must satisfy if they want their products considered further.

- Hardware. The DBMS should be capable of running on an IBM 4381 with 16M bytes of memory. In addition, the DBMS must support local-area networking, IBM's Systems Network Architecture and clustering.
- Operating system. The DBMS

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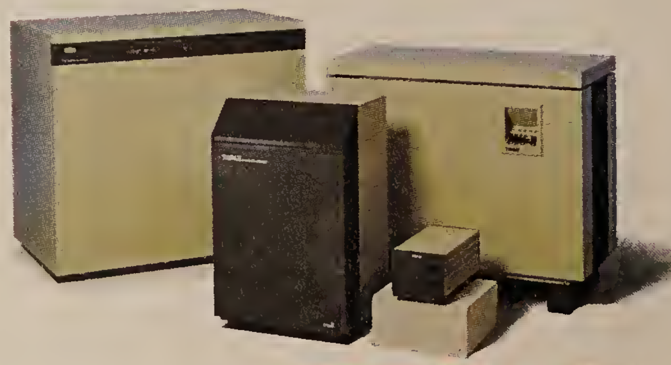

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A SCORECARD FOR EVALUATING DBMS VENDORS*

Organization's Computing Requirements	Weight	X	Vendor Score	=	Weighted Score
1. Hardware Support • Compatibility with current hardware • Compatibility with future hardware					
2. Operating System Support • Compatibility with current operating system • Compatibility with future operating system					
3. Terminal Support • interface to existing teleprocessing monitor • Support of existing teleprocessing applications • Access methods supported					
4. Data Dictionary • Interface to existing data dictionary • Dictionary active and integrated with rest of product line					
5. Host Language Interface • Compatibility with existing programming language					
6. Query and/or Report Writer • Ad hoc reporting capability • Spontaneous queries created by both technical and end users • User friendliness • Degree of dependence on DP technicians					
7. External File Support • SAM • VSAM					
8. Application Software (prepackaged and purchased) • Compatibility with general ledger, payroll, accounts payable/receivable and so on. Consider modifications involved.					
9. Critical Applications, Volumes, Response Time Requirements					
10. General Information • Vendor Support Quality Technical expertise Responsiveness Vicinity of vendor's technical staff • Number of support staff needed • Resource requirement • Data base structure (degree of flexibility)					
11. Installation					
12. Training					
13. Documentation					
14. Data Integrity and System Security • Referential integrity • Semantic integrity • Interface to existing security software					
15. Backup and Recovery					
16. Journal and Audit Trail • In conjunction with teleprocessing monitor's journal • Interface with security software					
17. Performance and Tuning • Existence of performance and tuning tools					
18. Reorganization • Is space reclaimed after deletion of data base records? • Any specific reasons for frequent reorganization?					
19. Micro-Mainframe Connection • Downloading from mainframe to micro • Uploading from micro to mainframe • EBCDIC (from mainframe) translated to ASCII (to micro) and vice versa					
20. Fourth-Generation Language, Prototyping and Applications Programmer Productivity Tools • Increase in programmer productivity • Prototyping tools • Ease of maintenance					
21. Costs • One-time license cost • Monthly lease • Maintenance and service charges					
22. Vendor Profile • Financial stability					
23. References • Satisfied customers • Growth in number of customers in the past year • Number of DBMS users					
24. Users Group Involvement • Active users group is a positive indication of stable product line					
Vendor's Total Score	▨		▨		

* Scorecard Legend
Weight: On a scale of one to 10 — with 10 being the highest — rate the importance of this function to your organization.
Vendor Score: Rate the performance level of each function as follows:
0 - Function not available 2 - Available but not demonstrated 4 - Clumsy 6 - Adequate 8 - Good 10 - Excellent
Weighted Score: Multiply the weight by the vendor score.

Source: Atre International Consultants, Inc.

Continued from page 38

must currently run under IBM's MVS/SP and be upwardly compatible with MVS/XA and future releases from IBM. It should also be executable under VM/CMS as well as MVS under VM/CMS.

- Response time requirements. The DBMS must support 6,000 transactions per hour from 60 on-line concurrent users with response time averaging two seconds for 95% of the time and up to a maximum of four seconds for the remaining 5% of the time.
- Host language interface. The DBMS must be capable of supporting Cobol and Fortran interfaces compatible with standard language processors.
- Report writer. The DBMS should directly interface with a report writer facility that allows users to easily select, retrieve and print data in an on-line mode. Output should optionally be directed to either a printer or a terminal.
- Query language. This should be an on-line, interactive query facility that interfaces directly with the DBMS for ad hoc retrieval of information by nonprogrammers.
- Data dictionary. The DBMS should include an integrated data dictionary/directory system.
- Restart and recovery. The DBMS must have a comprehensive and reliable recovery system that uses either the rollback approach, in which invalid or incomplete transactions and data base images are backed up; and/or the shadowing approach with journaling (or transaction recording) and recovery by reapplying transactions against a previous version of the data base. These facilities should also accommodate selected recovery for specific files, records or logical records.
- Teleprocessing monitor. The DBMS should include an interface to IBM's teleprocessing monitor, CICS.
- File support. The DBMS must support SAM, VSAM and external sequential files from Honeywell, Inc.'s GCOS 8 operating system.

The second portion of the request for proposal defines the technical specifications of those DBMS candidates being considered. This information should be gleaned directly from the vendor in the form of a written questionnaire. Make certain that the mailed survey poses its queries in the same sequence as those

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Managing a 4GL project

By GEORGE SARTY

Your organization has acquired a state-of-the-art data base management system, and one or more fourth-generation languages. You have been appointed project manager of the first large application development effort using this much-heralded new technology.

Sarty

As an experienced project manager, you have probably dealt with a variety of technologies, so why should a development project using fourth-generation language/DBMS technology present any special problems?

To begin with, fundamental differences exist between developing systems in a third-generation environment such as Cobol/VSAM and developing systems in the fourth-generation language/DBMS environment. As project manager, the success of the project and, ultimately, the long-term success of fourth-generation language/DBMS technology within your organization, hinges on your understanding of managing development using this technology.

A fourth-generation language/DBMS package is generally sold to an organization on the strength of promises to increase programmer productivity, shorten development cycles (and therefore reduce applications backlogs) and control the corporate "data explosion" with its attendant storage costs, by sharing data across applications.

Understandably, given the substantial investment such a package represents, corporate and MIS management expect to realize a significant payback in these benefits.

One of your first challenges as project manager, then, will be managing the performance expectations fostered, in all likelihood, by the DBMS vendor. It must be made clear to corporate executives that the acquisition of fourth-generation language/DBMS technology alone does not provide an immediate remedy to the organization's DP problems.

Only solid, long-term planning in data administration and systems development, plus a willingness to adopt new methods, enable an organization to realize the full benefit potential of a fourth-generation language/DBMS environment. To facilitate this process, it is worthwhile to join the users group for your DBMS to learn from the experiences of other organizations before setting out to develop your own data base system.

Most organizations have established a formal systems development

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Sarty is a consultant with Maxima Computer Management Consultants Ltd., an Ottawa-based consulting firm specializing in fourth-generation languages and data base management system technology and products.

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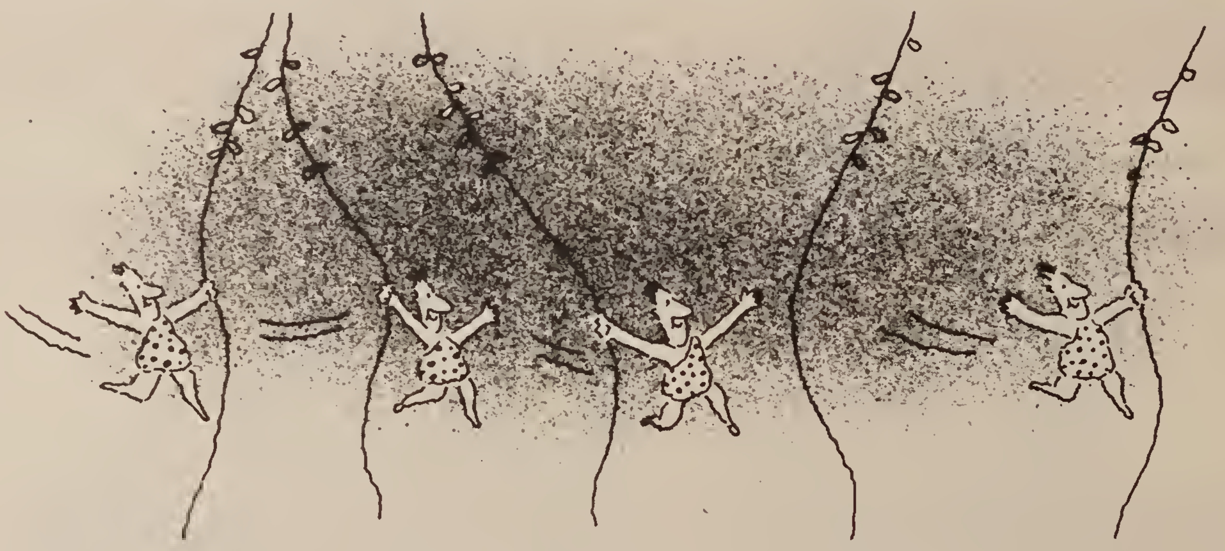

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methodology to assist in managing and controlling the development process. Very often, however, the existing methodology has been developed for use with Cobol/VSAM or other third-generation environments and may not be workable for a fourth-generation language/DBMS setup. A thorough review of your organization's methodology should therefore be undertaken prior to starting the project.

When using fourth-generation language technology, it is particularly important that data base design activities be addressed throughout the development life cycle.

In addition, because data bases must be able to be shared as well as expanded, design cannot be performed from a purely application-oriented perspective but must also include the corporate view.

Systems generally can be classified as either operational or decision support types. Operational systems, such as payroll or accounts receivable, are based on methodologies that incorporate a traditional or conservative approach.

Typically, this approach demands that system development activities be sequential: All user requirements must be specified before commencing with system design; system design must be completed before coding can begin and so on. Decision support systems usually make up the bulk of an organization's application backlog. They do not lend themselves to a sequential development methodology because user requirements are difficult to prespecify.

Also, unlike operational systems in which data is usually organized to be accessed by a specific application, decision support systems often have data requirements that cross application and organizational boundaries.

The need to meet these requirements is largely the motivation for acquiring a DBMS, so chances are that most of your system development will be of the decision support type.

How then do you address the problems associated with developing decision support systems? The key lies in the flexibility of a fourth-generation language, which allows the use of new techniques such as evolutionary prototyping and iterative systems development.

Evolutionary prototyping techniques of system development are particularly useful when requirements are primarily user-driven and/or when results are needed quickly.

Based on high-level requirements, an initial prototype is developed, consisting of screen scenarios but no detail processing or editing. The user can then specify changes or additional requirements that are used in the next stage of prototype evolution.

This prototyping technique utilizes the technology as a means of communicating with users and allows them to become actively involved in the process of defining and refining their requirements. Another advantage of evolutionary prototyping techniques is that the initial prototype can be used to develop an application data view at an early stage in the process.

As a final note, it should be remembered that increased programmer productivity — a benefit often mentioned by fourth-generation language vendors — does not translate directly into reduced development cycles.

Given that coding normally represents only 30% of the total development time and that extra time is required for data base design, it is unlikely that the development will be significantly faster for a fourth-generation language/DBMS project.

Most of the issues discussed here are typically encountered by organizations when they first attempt to develop a large-scale application using fourth-generation language/DBMS technology. Unfortunately, these problems often result in the belief that fourth-generation languages cannot deliver their benefits on a meaningful scale.

By identifying and addressing development problems at an early stage, however, fourth-generation language/DBMS technology can play a significant role in helping your organization achieve its data processing and corporate goals. ■

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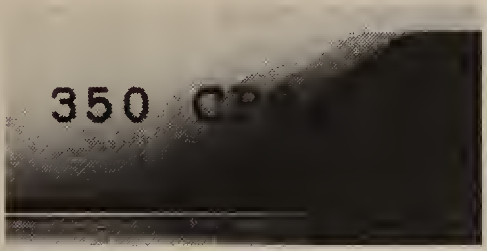

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Continued from page 40

outlined in the profile of your company's computing environment. Otherwise, you will spend weeks fishing for answers in vendor promotional materials and technical manuals.

Comparing the capabilities of different products is far more manageable when vendor material is consistently presented in a standard format. Another time-saving step is to specify one contact point from your organization and ask for a single vendor contact.

Evaluating vendor responses is the next step. Your company's in-house criteria and the mailed questionnaire comprise a DBMS checklist to be used in this phase (see vendor scorecard page 39). Two people should participate in the rating process since scoring via the point system is obviously subjective.

This occasion is also the appropriate time to invite contending vendors to provide technical presentations of their DBMS offerings. Upon completion of this step, four vendors, at most, should still be under consideration.

The user meeting involves interviewing references given by the four vendors. Be certain that the users' operations resemble that of your own environment. If your operating system is DOS/VSE, then the reference should not be running MVS/XA with 2,000 terminals attached. Also, make it clear to each vendor's sales representative that you wish to interview the references privately. This way, assured of being able to receive continued vendor personnel support, users will not feel intimidated about answering questions candidly.

Try to visit two user sites for each of the four vendors, ideally on the same day. You should not, however, visit user sites from different vendors on the same day — unless you want to feel like you have been to two movies and cannot remember what happened in which plot. As a further note of caution, be sure to compile a written report for each vendor's product on the day of your site visit.

Four people from your organization, including the sponsor manager, should conduct the vendor reference interviews. In addition to obvious queries regarding system performance and vendor support, questions to be posed to DBMS users should

Continued on page 48

Choosing a flexible 4GL

By RONALD DUBIEN

The pressures of increased applications backlogs and user demands for greater access to information prompt many DP managers to examine the advantages that fourth-generation languages claim over Cobol. Of principal interest are the promises of increased productivity and ease of use, and it is on the basis of these features that fourth-generation language products are most often evaluated. Unfortunately, these features alone do not guarantee the successful implementation of a fourth-generation language.

The most critical — and most often overlooked — factors to consider when evaluating a fourth-generation language are its flexibility and compatibility with the organization's hardware and software environment.

The flexibility of a fourth-generation language can be measured by its ability to support detailed fine-tuning of an application in both development and maintenance phases. In addition, the language must readily allow the user to incorporate arbitrarily sophisticated functionality, particularly given current trends toward on-line, interactive systems development.

There are two important reasons why a fourth-generation language must be truly flexible if it is going to be effective. The first relates to the changing nature of application backlogs. The second is that it must be able to reduce the errors introduced during the requirements definition phase and actual design of a system.

Traditionally, the greater part of an organization's data processing resources has been spent in the development and maintenance of operational systems such as payroll and accounts receivable. Development methodologies for such systems, in which users must prespecify (once and for all) their requirements on the basis of outmoded manual procedures, are still predominant in many DP departments.

But today's backlog consists of more than purely operational systems. It includes complex decision support and planning and management information applications, none of which lend themselves to prespecification.

Nonoperational systems, although defined by users in advance, are most effectively developed when the user has an opportunity to "test-drive" a prototype before final approval is given.

The inevitable changes requested during this process, while painful to implement in a Cobol environment, are comparatively simple if using a flexible fourth-generation language.

In addition to facilitating the

Dubien is president of R. J. Dubien and Associates, Inc., a data base management system consulting firm based in Ottawa. He is a former consultant with Maxima Computer Management Consultants Ltd. in Ottawa.

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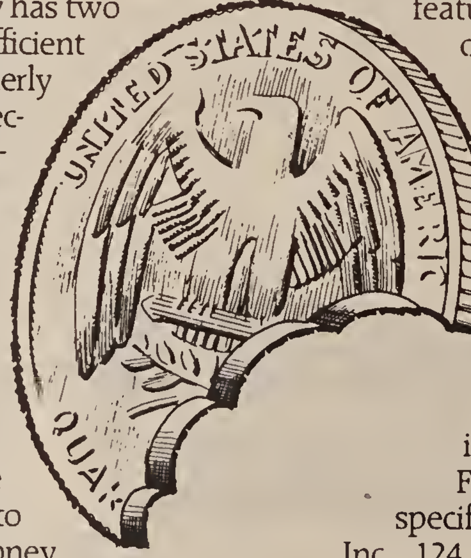

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development of nonoperational systems, a flexible fourth-generation language can be valuable in reducing the errors in defining user requirements that have traditionally plagued the systems development process.

Communication errors between users and analysts, documentation errors, changing technology and program interdependency all make it difficult to retrofit applications to accommodate new or expanded functionality.

When evaluating a fourth-generation language for flexibility, look for the following features:

- The degree of isolation between the language and the data structure.
- Cross-referencing of data usage in applications.
- The extent of automation (computer assistance) in making both large and small changes.

Very often a newly acquired fourth-generation language, having been successfully implemented in a small pilot project, provides disappointing results when it is put to work on more ambitious tasks. Indeed, some organizations find that the language adds to their applications backlog rather than to system functionality, but it is more likely that the fault lies with an incompatible hardware/software environment.

In most organizations, where data processing is already supporting a complex hardware/software environment, there exists little room for a sophisticated new software product that cannot be integrated easily. All too often such products, perceived to be of limited use by the DP department, are subsequently relegated to such mundane, isolated tasks as file maintenance.

Ongoing maintenance concerns dictate that existing applications, even if they meet user requirements, must be converted because they are in maintenance-only mode. Consequently, the applications backlog grows.

In order to be truly useful, a fourth-generation language must be able to process user data. And since the bulk of this data (such as inventory of sales records) resides within the existing environment, the fourth-generation language must be compatible with that environment.

Finally, when establishing criteria for evaluating a fourth-generation language, be sure to consider the direction of any relevant industry trends. In data base management system technology, for example, there appears to be growing vendor momentum behind multilevel architecture, driven by an active data dictionary.

Since a fourth-generation language would integrate with the data dictionary as an external facility, this type of architecture would allow for multiple fourth-generation languages in organizations where one product is inadequate to meet every user need.

Chances are, then, that the product line of most DBMS vendors will include a DBMS, a data dictionary as well as a fourth-generation language tool, with all three running in both central and distributed modes. ■

Books, events offer more information

Readers who are interested in learning more about data base management systems may find the following publications and seminars helpful.

Publications

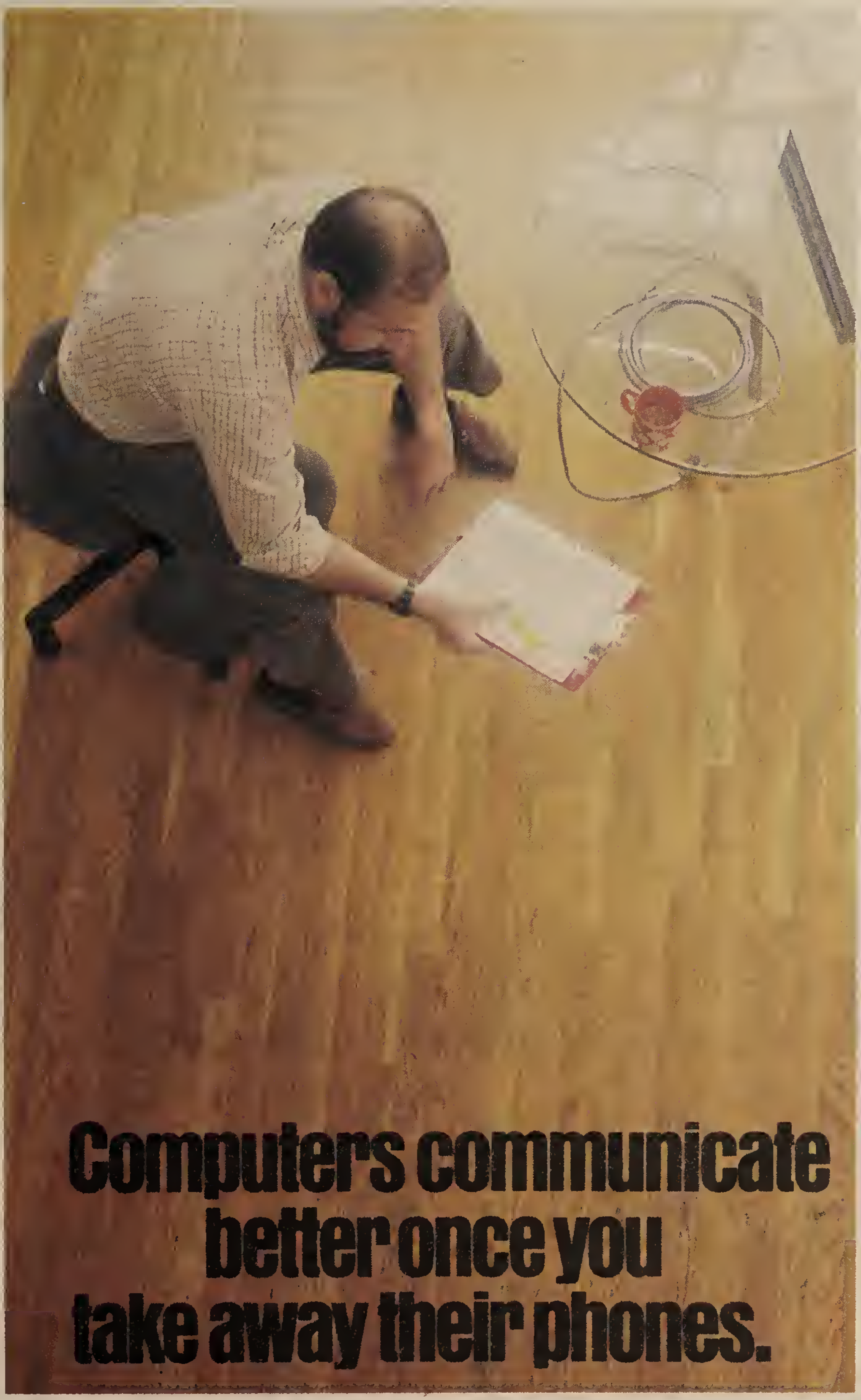
The Dynamics of Data Base. W. H. Inmon and Thomas J. Bird Jr. Prentice-Hall, Inc., Englewood Cliffs, N.J. 1986.

Database Technology and Management. Robert C. Goldstein. John Wiley & Sons, Inc., New York. 1985.

Database Machines and Database Management. Esen Ozkarahan. Prentice-Hall, Inc., Englewood Cliffs, N.J. 1986.

Seminars

APRIL 14-17, WASHINGTON, D.C. — **The National Database and 4th Generation Language Symposium.** Registration fees range from $395 to $795. Contact: Digital Consulting Associates, Inc., 6 Windsor St., Andover, Mass. 01810. Also being held June 9-12 in New York.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Mini DBMS mart growing

By JOHN GALLANT

Not only have minicomputer data base management systems become technologically sophisticated — and profitable — products in their own right, but they also are increasingly viewed as the intermediary vehicle for linking desktop systems and mainframes.

The performance of minicomputer systems continues to improve with minicomputer vendors aggressively targeting their hardware beyond traditional niches to the commercial data processing market. Thus, minis are becoming hosts to a variety of formerly mainframe-based applications — the types of applications that cry out for DBMS support.

In many ways, the future of the minicomputer DBMS market is closely tied to the trend toward networking of diverse processors and the migration of applications downward from the mainframe environment.

"There has been an awakened interest on the part of mini vendors who are realizing they don't have to bequeath to IBM the entire commercial marketplace," says Ann Morley, editor of "Software Watch," a newsletter from the Framingham, Mass.-based market research firm International Data Corp. (IDC).

"While IBM recently has been taking on Digital Equipment Corp. in the scientific/engineering market, a relatively small area, DEC is going after the entire business market," Morley says.

"DEC is saying, 'Run your decision support, office and even transaction applications on a VAX, and you can expect pretty good bang for the buck'. We'll see more and more decentralization of applications. At the heart of decentralization is the issue of managing data bases, and that is why we are seeing so much interest in mini DBMS," she says.

In terms of market penetration, Morley says, the mini DBMS market can be likened to its mainframe counterpart of 10 years ago. While IDC estimates that roughly 90% of IBM's high-end mainframes run at least one DBMS, perhaps just 30% of all DEC VAXs can boast a DBMS. For less widely installed minis, DBMS usage may be only 20%.

But what the mini market lacks in installed base, it more than makes up for in growth potential. Estimates of future growth in minicomputer DBMS sales range from a conservative 30% per year up to 40% annually through the rest of this decade. Morley says the minicomputer DBMS market grew at about 32% in 1985, even as mainframe DBMS vendors, slowed by the computer industry slump, experienced much lower growth.

Different segments of the mini DBMS market will experience different growth, explains Gary Morgenthaler, president of Alameda, Calif.-based Relational Technology, Inc. Relational Technology markets Ingres, one of the leading independent minicomputer DBMS products.

> ***Estimates of future growth in minicomputer DBMS sales range from a conservative 30% per year up to 40% annually through the rest of this decade.***

"Overall, 30% to 40% growth is realistic," he says. "But I see even higher growth rates for certain sectors of the Unix-based mini market and lower growth for software aimed at mini vendors with proprietary operating systems."

Oracle Corp. President Lawrence Ellison thinks the term "mini DBMS market" may no longer be quite accurate. "The mini market traditionally was made up of government agencies, small divisions in large corporations, engineering departments and universities. In general, large corporations did not do data processing on anything but mainframes," Ellison says.

"But the trend in large organizations is to network mainframes to minis to personal computers," he says. "From now on, the whole DBMS market has to be viewed differently. What users are looking for is the same software running on minis, mainframes and micros." (Oracle's relational DBMS runs in those three processor environments.)

Relational Technologies' Morgenthaler adds, "What is clear is that IBM's DB2 is a strategic product and one that will be successful. What falls out of that is that there will be considerable interest among mainframe customers in relational mini DBMS products that are SQL-based and offer applications portability into the mainframe DB2 environment."

Having a DBMS that operates across processor boundaries allows

See GALLANT page 48

Gallant, former Computerworld *senior editor of software and services, is now managing editor of* Network World, *a sister publication.*

National Database &
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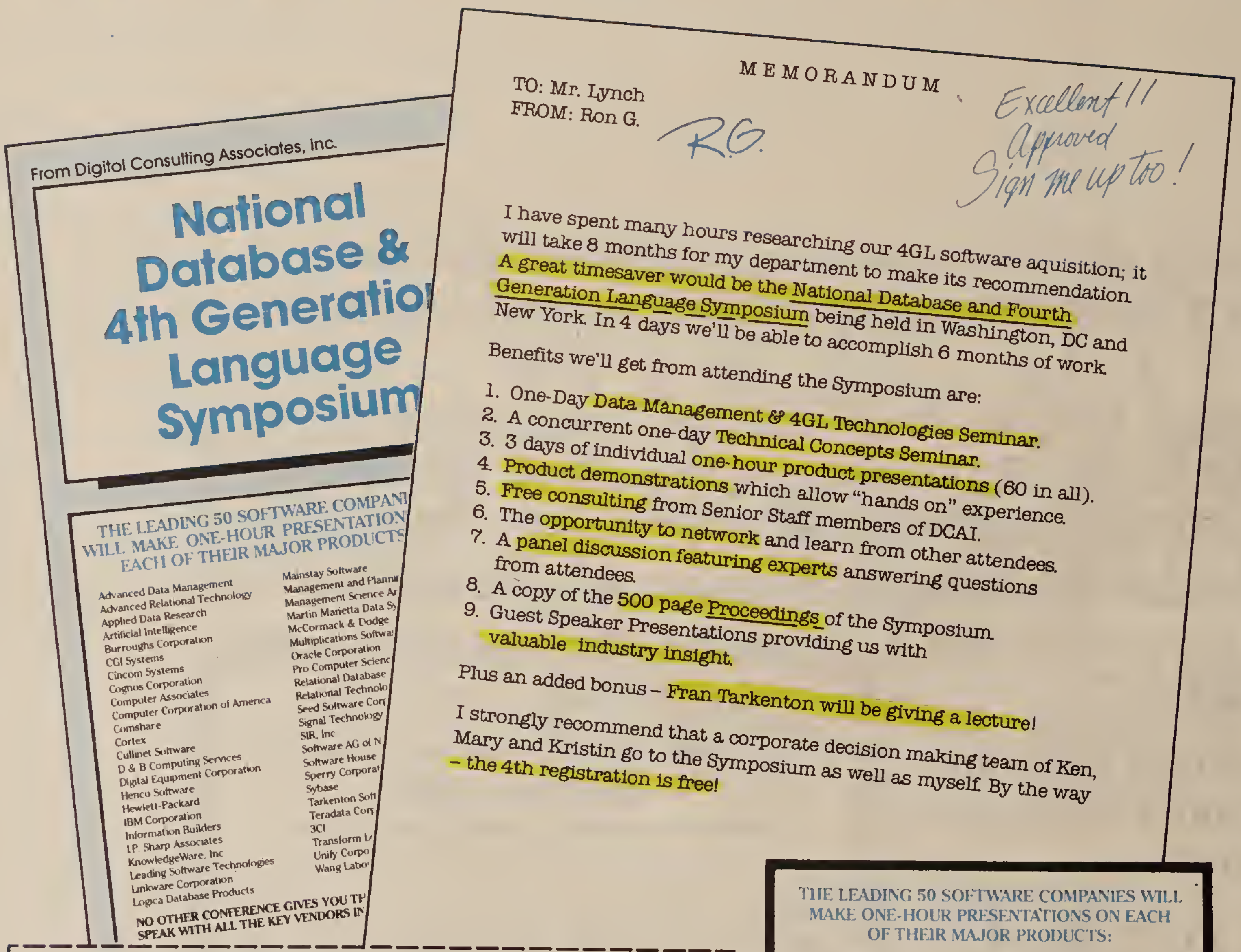

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TO: Mr. Lynch
FROM: Ron G. R.G.

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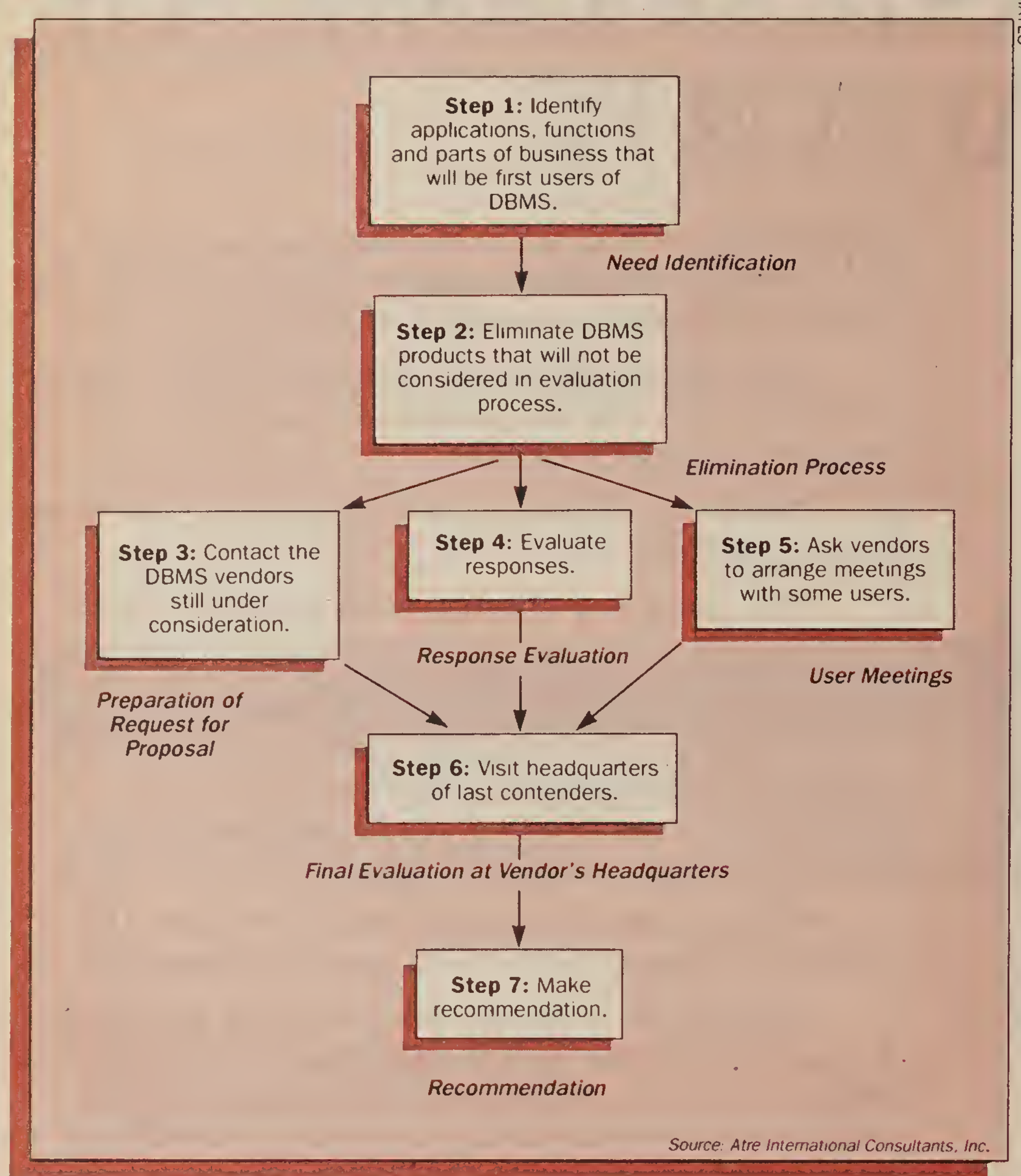
HOW TO EVALUATE AND SELECT A DBMS


Step 1: Identify applications, functions and parts of business that will be first users of DBMS.
Need Identification
Step 2: Eliminate DBMS products that will not be considered in evaluation process.
Elimination Process
Step 3: Contact the DBMS vendors still under consideration.
Step 4: Evaluate responses.
Step 5: Ask vendors to arrange meetings with some users.
Preparation of Request for Proposal
Response Evaluation
User Meetings
Step 6: Visit headquarters of last contenders.
Final Evaluation at Vendor's Headquarters
Step 7: Make recommendation.
Recommendation

Source: Atre International Consultants, Inc.

MITCHELL J. HAYES

Continued from page 42

include the following:

- How many people on your staff are committed to maintenance monitoring and tuning of the data base?
- Do you have separate test and production data bases?
- How many transactions are performed on first shift, and what is the mix (update, query and so on)?
- What is the maximum load of transactions you get through your system? What is the response time at peak load?
- How many terminals are being utilized, and of those, approximately how many are concurrent users? Are there any remote sites tied to the data base?
- How do you handle your data base backup and recovery?
- How often must you reorganize your data bases?

After meeting with users, you should eliminate all but two vendors. I recommend not having a clear-cut winner at this point since if only one vendor is a finalist, you lose leverage in contract negotiations.

Visiting the headquarters of the two finalists represents the next step in the DBMS evaluation and selection process.

You should already know the vendors' market positions and financial situations. But visiting the company headquarters provides an opportunity to find out about its research and development effort.

If an organization does not spend adequate amounts of resources (at least 8% of revenue) on R&D, the product line most probably will soon be obsolete. Other important issues to address include the amount of the budget set aside for technical support and the type of infrastructure established for the support organization.

Making a recommendation to top-level management involves justifying the conclusions reached regarding a specific DBMS selection.

In your executive summary, you must justify not only the reasons for recommending a particular vendor but also the reasons for eliminating those vendors not selected.

Many companies experience needless problems — and expenditures — when trying to select a DBMS. In most cases, using a well-planned strategy, executed by DBMS evaluation team experts within a three-month time frame, will yield positive, productive results. ■

GALLANT from page 46

for some measure of applications portability, analysts say. But the DBMS role in the expanding scope of minicomputer use must be wider, Morgenthaler says.

"Having a product in different hardware environments affords applications portability," he says. "But there is also the issue of interconnecting those environments to share data."

Relational Technology currently offers the Ingres/Net product that allows Unix-based and DEC VMS-based minis running Ingres to swap data. Morgenthaler says Ingres/Net will be upgraded to link into IBM's Systems Network Architecture within the next year. Ingres also runs on IBM mainframes under VM/CMS.

> **"**
>
> ***True relational DBMS, pushing for mainstream acceptance in the mainframe world, is the rule rather than the exception in the mini environment.***

Traditional minicomputer DBMS vendors such as Relational Technology and Oracle are not the only ones leveraging the networking trend. Mainframe stalwarts Software AG of North America, Inc. and Cincom Systems, Inc. also tout the current multienvironment capabilities of their DBMS offerings, IDC's Morley says.

One group of observers contends that mainframe giants like Cullinet Software, Inc. and Applied Data Research, Inc. will also take aim at the burgeoning mini market. But others say their products are poorly suited to the minicomputer environment and porting them would require perhaps overly costly conversion.

How do the mainframe and mini DBMS worlds differ? According to Eric Dean, a manager in the Technical Services Organization management consulting arm of Arthur Andersen & Co., "In the mainframe world, a DBMS is clearly a tool with which DP management can control the shop. Mini products are used by smaller groups with less formal requirements and less need for control. The products are simpler, and that is both a strength and a weakness. Those looking at it from a mainframe perspective would say that mini DBMS will grow more and more complicated as they take on a bigger role. I am not sure that is going to be the case."

In some respects, analysts say, the mini DBMS realm is more advanced than the mainframe arena. True relational DBMS, pushing for mainstream acceptance in the mainframe world, is the rule rather than the exception in the mini environment.

"The first thing minicomputer users needed was ease of use and productivity. That is why relational got a foothold in the mini world long before it did in the mainframe world," Oracle's Ellison says.

But despite the promise of future growth, minicomputer DBMS vendors still have a long way to go to match the financial success of their mainframe brethren.

"There's plenty of market opportunity. But there is still some reticence on the part of customers because they are not convinced yet that they need to make that investment in DBMS," Morley says.

"Mini buyers are much more price sensitive than mainframe buyers. They are used to having software bundled either by their OEM or hardware vendor. The concept of paying for packaged software is really a mainframe notion. Technology is pushing these users to look at DBMS, but users are saying, 'This isn't the way we bought software before.' " ■

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MINICOMPUTER AND MAINFRAME DBMS

Advanced Data Management, Inc.
15 Main St.
Kingston, N.J. 08528
DRS Database Management System
Number installed 275
Type .... DBMS
Hardware .... DEC VAX series
Hardware size .... Minicomputer to mainframe
Price .... $16,000-$72,000

DRS includes RPW II, a report writer; DRS/Graph; Versatile Input Processor; host language interface; and specialized math and statistical software. Supported host languages include Cobol, Fortran, Pascal and assembler.

Applied Data Research, Inc.
Rt. 206, Orchard Road
Princeton, N.J. 08540
ADR/Datacom/DB
Number installed 1,100
Type .... Inverted, relational DBMS
Hardware..... IBM 370, 4300, 3082, 3083, 3084, 3090
Hardware size .... Small to large mainframe
Price .... $89,000-$116,000

Datacom consists of DBMS, fourth-generation language, integrated data dictionary, query facility, report writer, Cobol application development system, distributed data processing system and DBMS migration software tools. Datacom, initially an inverted DBMS, has been redeveloped into one that supports relational processing through ADR's Ideal, Dataquery and ADR/DL.

Battelle Software Products Center
505 King Ave.
Columbus, Ohio 43201
DM
Number installed 30
Type .... Relational DBMS
Hardware .... DEC VAX series, Control Data's Cyber series
Hardware size . Minicomputer to mainframe
Price .... $15,000-$46,000

DM supports both entity and referential integrity and handles multi-data base, multiuser operations in a multithreaded environment. Search criteria supported include numeric ranges, word proximity and Boolean logic. Features security, active dictionary, screen manager and a query and manipulation language similar to IBM's SQL.

Britton Lee, Inc.
14600 Winchester Blvd.
Los Gatos, Calif. 95030
Intelligent Database Machine (IDM)
Number installed 600
Type .... Relational data base machine
Hardware... Very large-scale integration microprocessor
Hardware size .... Not appropriate
Price .... $50,000 for Relational Server 310
$100,000 for IDM 500/X
$150,000 for IDM 500/XL
$200,000 for IDM 500/XLE

This product line provides comprehensive relational DBMS functions including the following: transaction management, crash recovery, dynamic data definitions, multihost data base access, change logging, high-speed cache, concurrency control, data indexing, security and IBM's SQL and QUEL query languages.

Burroughs Corp.
1 Burroughs Place
Detroit, Mich. 48232
Data Management System II (DMS II)
Number installed 5,100
Type .... Fourth-generation language/DBMS
Hardware .... All Burroughs lines
Hardware size .... Small to large mainframe
Price .... $30,000-$50,000

DMS II is a flexible DBMS with multiple data model views through inverted structures. Supports flat, hierarchical, network or relational data models. Data manipulation language functions are supplied through host system's high-level languages. Options include Logic Information Network Compiler (LINC II), an applications generator/fourth-generation language used for on-line data base systems. LINC II generates complete applications including DMS II data base and access paths, data base Data Description Language, data communications control system, inquiry and reporting mechanisms and necessary systems software.

Business Computer Solutions, Inc.
1200 Northwest 78th Ave.
Miami, Fla. 33126
Zfour
Number installed 15
Type .... Fourth-generation language/DBMS
Hardware .... Wang VS, scheduled to be ported to Unix systems this June
Hardware size .... Minicomputer to mainframe
Price .... $10,000-$55,000

Zfour is a complete fourth-generation environment with development and decision support tools including a fully relational DBMS and its own query language, QL1. It is completely integratable with all Wang VS utilities including word processing, VS Graphics and VS Report.

California Software Products, Inc.
Suite 300
525 Cabrillo Park Drive
Santa Ana, Calif. 92701
Maxximum
Number installed 45
Type .... Hierarchical DBMS
Hardware .... Gould Concept/32
Hardware size .... Superminicomputer
Price $23,400

Maxximum is a full-functioned time-critical data base for engineering and scientific applications. It includes inquiry utilities, restructuring and security features and Pascal and Fortran interfaces.

Century Analysis, Inc.
114 Center Ave.
Pacheco, Calif. 94553
Mbase/9
Number installed 250
Type .... Relational DBMS
Hardware .... NCR 9800, NCR Criterion
Hardware size .... Mainframe
Price $25,000

Mbase/9 is a multitasking, multi-indexing relational-like DBMS. Functions include utility index system, library subsystem, data subsystem, file access subsystem and query and event-oriented recovery.

Continued on next page

The companies included in this chart responded to a recent telephone survey conducted by *Computerworld*. Vendor list was supplied by Digital Consulting Associates, Inc. Further product information is available from the vendors.

Source: CW Chart

CW chart compiled by Christie Sears

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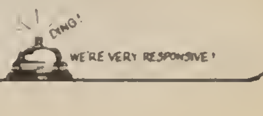
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MINICOMPUTER AND MAINFRAME DBMS

Cincom Systems, Inc.
2300 Montana Ave.
Cincinnati, Ohio 45211
Ultra Interactive Database System
Number installed 160
Type .... DBMS and applications generator
Hardware .... DEC VAX series, DEC VAX/VMS
Hardware size .... Superminicomputer
Price .... $45,000-$80,000

Ultra is fully relational with support of both structure and integrity (entity, integrity and domains) relational components. Joins are implemented through iterative Get. Product supports three-schema architecture that isolates applications from both physical and logical data base changes. Components include Logical User View, intelligent query, in-line directory, reporter and data manipulation language.

Cincom Systems
Supra
Number installed 15
Type .... Fourth-generation language/DBMS
Hardware .... All IBM mainframes and plug compatibles
Hardware size .... Mainframe
Price .... $145,000-$274,000

Supra is a relational DBMS based on a three-schema architecture. It includes a relational data manager; physical data manager; in-line directory; Spectra, an end-user query tool; and Normal, a data base design tool.

Computer Associates International, Inc.
711 Stewart Ave.
Garden City, N.Y. 11530
CA-Universe
Number installed .... Not available
Type ... Relational DBMS and application development tool
Hardware .... IBM 370, 4300, 3081, 3083, 3090
Hardware size .... Mainframe
Price .... $110,000-$170,000

CA-Universe overall is very user-friendly for a mainframe data base environment. Integrated facilities include automated forms generator, form chaining and on-line updating and reporting. System includes fourth-generation language, integrated data dictionary, text editor, query, report generator and application generator.

3CI
155 W. Harvard
Fort Collins, Colo. 80525
Infocen
Number installed 56
Type .... Fourth-generation language/DBMS
Hardware .... DEC VAX, Data General MV, Concurrent
Hardware size .... Superminicomputer
Price .... $12,900-$39,900

Infocen is an information center relational DBMS and fourth-generation language. Facilities include painted forms, query processor, statistics, report generation, color graphics, procedural language interface, alias tables, integrated data dictionary/directory, prompter and Help facility. The company's NSQL data language is like IBM's SQL but higher level without a need to specify table names.

Computer Corporation of America
4 Cambridge Center
Cambridge, Mass. 02142
Model 204
Number installed 450
Type .... DBMS
Hardware .... IBM mainframes and plug compatibles
Hardware size .... Medium to large mainframes
Price .... $155,000-$250,000

Consists of an inverted list DBMS, procedural fourth-generation language, dictionary and optional statistical and electronic mail packages. Uses an inverted file architecture to support relational-like data model and was the first major product to have an integrated high-level applications development language (user language). This language resembles ADR's Ideal, and although it was designed for programmers, not end users, it is very English-like and readable.

Concurrent Computer Corp.
2 Crescent Place
Oceanport, N.J. 07757
Reliance Plus
Number installed 500
Type .... Relational DBMS
Hardware .... Perkin-Elmer 3200 series
Hardware size .... Superminicomputer
Price .... $3,000-$25,000

Reliance Plus includes transaction processing monitor, distributed security system, active data dictionary, programming productivity tools and administrative utilities and source librarian. Optional components include query, update, report generation, electronic mail and networking.

Cullinet Software, Inc.
400 Blue Hill Drive
Westwood, Mass. 02090
Integrated Database Management System/Relational (IDMS/R)
Number installed 2,000
Type .... Codasyl, relational DBMS
Hardware .... IBM mainframes and plug compatibles
Hardware size .... Medium to large mainframes
Price .... $75,000-$350,000

IDMS/R provides relational capabilities for MIS applications development. Features include Open System Architecture, Automatic System Facility, an active data dictionary, fourth-generation language, on-line query, Logical Record Facility, integration with Cullinet's Information Center Management System and backup and recovery capabilities.

Data General Corp.
Contact local sales representative
DG/DBMS
Number installed .... Not available
Type .... Codasyl DBMS
Hardware .... Data General MV series
Hardware size .... Minicomputer to superminicomputer
Price .... $3,000-$15,000 per CPU (one-time license fee)

DG/DBMS is a comprehensive Codasyl DBMS well suited for serious production and transaction processing environments. Optional modules include Transaction Processing Management System Present, a query report and graphics utility and a comprehensive data dictionary.

Data General
Contact local sales representative
DG/SQL
Number installed .... Not available
Type .... Relational DBMS
Hardware .... Data General MV series
Hardware size .... Minicomputer to superminicomputer
Price .. $3,000-$15,000 per CPU (one-time license fee)

DG/SQL is recommended for a wide range of data management applications, serious production and transaction processing environments including engineering, scientific, computer-aided manufacturing and design and decision support.

Continued on next page

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Data Language Corp.
47 Manning Road
Billerica, Mass. 01821
Progress
Number Installed 1,500
Type.............Fourth-generation language/relational DBMS
Hardware.........Pyramid Technology's 90X, 90MX, 98XE, 98X and Workcenter; DEC's VAX-11/730, VAX-11/750 and VAX-11/780
Hardware size ....Microcomputer to minicomputer
Price .... $695-$19,500

Progress is an application development system combining a fourth-generation language with a high-performance DBMS. System facilities provide a single environment for building transaction-oriented applications without conventional programming. Progress also includes data dictionary, screen and report formatter and editor.

D&B Computing Services
187 Danbury Road
Wilton, Conn. 06897
Nomad2
Number Installed ....Not available
Type.............Fourth-generation language/relational DBMS
Hardware........... IBM mainframes and plug compatibles
Hardware size .... Mainframe, microcomputer
Price $135,000

Nomad2 has its own language that has both procedural and nonprocedural components and is callable from standard host languages. The degree of system integration is greater than that of Martin Marietta Data Systems' Ramis or Information Builders' Focus. System includes decision support, integrated statistical package with more than 140 functions, graphics, report writer, ad hoc query and browsing and financial modeling. Nomad2 has an excellent reputation with its users as a highly productive development tool.

Digital Equipment Corp.
Contact local DEC sales representative
VAX Information Architecture (VIA)
Number installed ....Not available
Type.........................Codasyl-based DBMS
Hardware...........................DEC VAX 8600
Hardware size .... Superminicomputer
Price ..... $15,000-$40,000 for single-user software license package

VIA features an integrated set of data base management products (available separately or in packages) operating with VAX/VMS. These include the following: application control and management system (fourth-generation language for heavy transaction processing), terminal data management system (transaction processing and screen mapping), VAX DBMS (Codasyl DBMS), VAX Record Management System, VAX Datatrieve (fourth-generation language for query and report generation), VAX common data dictionary, VAX Rdb VMS relational data base, VAX VTX (videotex), Decgraph and Decslide.

Foothill Research, Inc.
Suite 300
1301 Shoreway Road
Belmont, Calif. 94002
Style
Number installed 30
Type.............Fourth-generation language/DBMS
Hardware.............Data General MV series, DEC VAX series
Hardware size .... Supermicrocomputer to minicomputer
Price .... $12,000-$45,000

Style is a full-featured development system that includes the following: programming/procedural language, relational/hierarchical DBMS, transaction controller, integrated data dictionary, query/reporting menus, complete security, screen painting and editor. Product has foreign language capability including direct support for Kanji keyboards (in both data and command language).

Henco Software, Inc.
100 Fifth Ave.
Waltham, Mass. 02154
Info
Number installed 3,200
Type.............Fourth-generation language/relational DBMS
Hardware.............DEC, IBM, Harris, Prime, Data General and Honeywell
Hardware size .... Minicomputer to mainframe
Price .... $19,500-$65,000

Info includes interactive data dictionary, data entry system, query language, report writer, nonprocedural language, data security and interactive edit. English-like fourth-generation language has links to business graphics and word processing.

Hewlett-Packard Co.
Contact local HP sales office
Turbo Image/V
Number Installed 25,000
Type.................................. Network DBMS
Hardware..........................HP 3000 family
Hardware size. ....Minicomputer to superminicomputer
Price .... $20,000-$150,000 (DBMS bundled with hardware)

Turbo Image/V uses a two-level physical parent/child structure, Intrinsic procedures and features full rollback and rollforward recovery. Rapid, a set of productivity tools that includes fourth-generation language, report writer and end-user inquiry utility, is optionally available.

Honeywell, Inc.
Contact local Honeywell sales representative
DM IV
Number Installed ....Not available
Type...............................Relational DBMS
Hardware... Honeywell DPS 8, DPS 88, DPS 90
Hardware size ....Large mainframe
Price .... $1,041 per month lease

The DM IV standard facility includes the DM data manager, the Cobol 74 subschemer translator, query, data dictionary and shared Integrated Data System (IDS/II). IDS/II provides flexible data organization and records processing in a random-access, mass storage environment.

IBM
Contact your local IBM representative
IMS
Number Installed ....Not available
Type...................High-performance DBMS
Hardware... IBM 3081, 3083, 3084, 3090, 4381, MVS and XA
Hardware size ....Large mainframe
Price .... IMS/VS data base $150 per month
IMS/VS data control $2,100 per month
IMS/Fast Path $1,750 per month
IMS Data Dictionary $1,040 per month

IMS is a very specialized but unfriendly DBMS. It is well suited for the largest transaction processing data base, data control and teleprocessing terminal environments. Announced for this spring is Release 2.1, with more data sharing and more virtual memory for Fast Path users.

IBM
SQL/DS Release 3.5
Number Installed ....Not available
Type...............................Relational DBMS
Hardware................IBM 370, 4300 series, 3081, 3083, 3084, 3090, 4381, any DOS VSE or VM machine
Hardware size .... Superminicomputer to medium mainframe
Price ....$464 per month

SQL/DS Release 3.5's highlights include support for installation-defined archive/restore procedures, log archiving, improved diagnostics for data base errors, directory verification option and tape handling enhancements. SQL/DS now allows an installation to take advantage of most available DASD backup and restore facilities. The SQL/DS diagnostics provided on data base and SQL/DS failures have been improved to allow better isolation of the data or transactions that cause the failure.

Continued on next page

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Chicago, IL 60606
Phone: 312/346-0642
Telex: 332979

REALIA inc.

MINICOMPUTER AND MAINFRAME DBMS

IBM
DB2
Number Installed ....Not available
Type..............................Relational DBMS
Hardware... IBM 3081, 3083, 3084, 3090, 4381 series for MVS or MVS/XA
Hardware size ....Large mainframes
Price ....$16,050 or $2,675 per month

DB2 was designed to satisfy the data base needs of a broad range of transaction processing applications. The DB2 Release 2 improvements enhance its ability to meet the requirements of operational data base management. Data Extract Version 2, announced this February, provides additional facilities for extracting data to be loaded into or extracting data from either DB2 or SQL/DS relational data bases. DB2 operates as an MVS subsystem and was designed to utilize extended architecture, including 31-bit virtual addressing and large real storage.

Infodata Systems, Inc.
5205 Leesburg Pike
Falls Church, Va. 22041
Inquire
Number installed 325
Type.............Fourth-generation language/relational DBMS
Hardware........................IBM 4300 series
Hardware size ....Mainframe
Price ....Not available

Inquire is a generalized DBMS with text management capabilities and on-line standards and procedures.

Information Builders, Inc.
1250 Broadway
New York, N.Y. 10001
Focus
Number installed 1,800
Type.............Fourth-generation language/DBMS
Hardware.............All IBM mainframes and plug compatibles
Hardware size ....Medium to large mainframe
Price ....$43,000 to $125,000 (not dependent on CPU size)

Focus, a popular information center tool, is functionally very broad and relatively easy to use for IBM 370-type applications. It consists of an English-like nonprocedural language, relational access languages, DBMS, interactive query and reporting, data dictionary, screen painting and management and menu/AI-based talk technology.

Information Builders
Focus/VAX
Number installed 100
Type.................................Nonprocedural
Hardware.........................DEC VAX, Wang
Hardware size ....Minicomputer
Price ....$21,000-$52,000

A version of mainframe Focus, this product consists of DBMS, fourth-generation language and query reporting facilities. Nonprocedural language features query, reporting, graphics, statistics, financial modeling, spreadsheet and data transportability between mainframe and personal computer versions.

Information Resources, Inc.
200 Fifth Ave.
Waltham, Mass. 02254
Express
Number installed 300
Type...................Decision support system
Hardware...........................IBM and Prime
Hardware size .... Superminicomputer to mainframe
Price ....$65,000-$125,000

Express is an integrated decision support system that includes a true data base management system, a set of fourth-generation language tools designed for easy modeling, spreadsheet, statistics, business graphics, interactive execution and job compilation. It also includes a set of strategic business applications. Designed for non-DP users such as those in marketing and finance. Also being used by MIS departments for applications development. Includes DBMS, display facilities, data manipulation, model building and active integrated dictionary.

Logica Database Products, Inc.
20 Exchange Place
New York, N.Y. 10005
Rapport
Number Installed 350
Type..............................Relational DBMS
Hardware........ Prime, DEC VAX, Honeywell, Data General, Symbolics, Harris, IBM mainframes
Hardware size ....Microcomputer to mainframe
Price ....$1,500-$96,000

Product is widely used in large U.S. banks and has a good reputation for efficiency and ability to handle large transaction volume. Most important needed improvements are in greater integration of the different system components and friendlier, menu-driven user interfaces. (The product now is most suitable for programmer use.) Features a fourth-generation language with procedural language for on-line systems generation. Includes screen painter, screen linking, report by form and query language.

Martin Marietta Data Systems
P.O. Box 2392
Princeton, N.J. 08540
Ramis II
Number Installed 1,600
Type.............Hierarchical, relational DBMS
Hardware.............All IBM mainframes and plug compatibles
Hardware size ....Microcomputer to large mainframe
Price ....$30,000-$90,000

Ramis II includes a nonprocedural language that is popularly used against Ramis II DBMS and many other DBMS. Also includes its own DBMS, application manager, data dictionary natural language comprehension based on artificial intelligence and storage and retrieval reading access. Data can be accessed three ways: natural language (English or French), menu prompt or nonprocedural commands. Features include SAS Institute interface, graphics and personal computer version with mainframe link.

Micro Data Base Systems, Inc.
P.O. Box 248
Lafayette, Ind. 47902
MDBS III
Number Installed ....Not available
Type............................Extended network
Hardware.............. DEC VAX-11/70 series
Hardware size .... Microcomputers to minicomputers
Price .... $3,900-$40,000

MDBS III's extended network DBMS supports natural data modeling in a variety of configurations. MDBS III facilities enforce data security, ensure data integrity and provide automatic program generation, concurrency control and performance tuning.

National Information Systems, Inc.
20370 Town Center Lane
Cupertino, Calif. 95014
Accent R
Number Installed 180
Type.............Fourth-generation language/relational DBMS
Hardware..................Decsystem-10, -20, DEC VAX
Hardware size .... Medium mainframe
Price ....$12,000-$55,000

HOW TO GET AN ELE

An extended relational DBMS that supports 30 arrays and multiple record types (hierarchies) in the same set. Other features and functions include report writer, nonprocedural query language, programming language, interactive data manipulation language, text editor, command language, full screen form generator, host language interfaces and interfaces to spreadsheets, word processing, statistics for social sciences, decision support system and graphics. The procedural language is suitable for general DP including data entry, validation and updating and reporting. Accent R is a comprehensive general-purpose system competitive with products such as Oracle Corp.'s Oracle and Relational Technology's Ingres.

Oracle Corp.
20 Davis Drive
Belmont, Calif. 94002
Oracle
Number installed 2,000
Type..............................Relational DBMS
Hardware............ IBM MVS, VM/CMS; DEC VAX; Data General MV series; Hewlett-Packard 9000 series
Hardware size .... Supermicrocomputer to mainframe
Price .... $12,000-$144,000

System includes relational DBMS, application generator, report writer, interactive query, text editor, word processor, spreadsheet, data dictionary and intelligent micro to mainframe link. Oracle uses IBM's SQL data language for query, data manipulation and definition and is compatible with IBM's DB2 and SQL/DS.

Pick Systems
1691 Browning
Irvine, Calif. 92714
Pick
Number Installed 60,000
Type...Relational DBMS with operating system
Hardware.........Honeywell, IBM, DEC, Altos
Hardware size .... Supermicrocomputer to mainframe
Price .... $495-$70,000

Product is a popular portable operating system with an integrated DBMS. It is frequently mentioned as an alternative to Unix for multiuser cross-vendor applications. Product is known under many different names, such as Microdata Reality from McDonnell Douglas Computer Systems, Prime Information from Prime Computer, Ultimate from both Honeywell and DEC and Mentor from Applied Digital Data Systems.

Prime Computer, Inc.
Prime Park
Natick, Mass. 01760
Prime Information
Number Installed 1,600
Type.............Fourth-generation language/relational DBMS
Hardware......... Prime 2350, 2450, 2655, 9655, 9750, 9955
Hardware size .... Superminicomputer
Price ....$7,000 for office version; $15,000 for computer room implementation

Prime Information's features include relational-like data management system, English-like query and report generator, structured procedural language, editor that supports record maintenance and update and a command and control facility.

Prime Computer
Primeway
Number Installed ....Not available
Type.................................Codasyl DBMS
Hardware.......... Prime 2350, 2450, 2655, 9655, 9750, 9955
Hardware size .... Superminicomputer
Price $20,000

Complete development environment incorporating Prime DBMS and the following: CRT forms generation, test facilities, Help facilities, security, prototype facility, source editing, DBMS interface, audit, integrity and recovery, operational transaction control, language interfaces and networking.

Relational Technology, Inc.
1080 Marina Village Pkwy.
Alameda, Calif. 94501
Ingres
Number Installed 3,000
Type.............Fourth-generation language/relational DBMS
Hardware....................DEC VAX/VMS, Unix
Hardware size ....Microcomputer to mainframe
Price .... $7,500-$90,000

System includes relational DBMS, two query languages (QUEL, SQL), report writer, report by forms, interactive data dictionary, fourth-generation language, application by forms, query by forms for query update, screen painter, visual forms editor, graphics, networking and query optimizer.

Rexcom Systems Corp.
10333 Richmond
Houston, Texas 77042
Rexcom
Number Installed 350
Type.............Fourth-generation language/relational DBMS
Hardware............... DEC VAX, Prime, Harris
Hardware size ....Microcomputer to minicomputer
Price .... $5,000-$44,500

Rexcom supports the relational model but allows subsidiary hierarchical files. Product was designed for multiuser environments with performance requirements. System includes editor, relational DBMS, fourth-generation language for both on-line screens and batch applications, report writer, query language, data dictionary/directory, Cobol/Fortran bidirectional interfaces, teleprocessing journaling and security.

Seed Software Corp.
2121 Eisenhower Ave.
Alexandria, Va. 22314
Seed
Number installed .... 300+
Type..............................Codasyl network
Hardware..........Prime, DEC VAX, IBM 370, Gould
Hardware size ....Microcomputer, minicomputer to maxicomputer
Price .... $995-$80,000

The Seed data base system features a fourth-generation language based on artificial intelligence technology. The application development system includes data manipulation language, batch processing data base loader and data dictionary and configuration management tool. Decision support option includes query language with relational-like view of Seed's data base and automatic data base navigation and a nonprocedural report writer with calculation abilities.

Signal Technology, Inc.
5951 Encina Road
Goleta, Calif. 93117
Smartster
Number installed 300
Type...............Fourth-generation language
Hardware.................................. DEC VAX
Hardware size ....Minicomputer
Price .... $6,000-$40,000

Smartster is a fourth-generation language, application development and information management system. Reportedly the only independently developed fourth-generation language product to pass the DEC screening, Smartster is totally integrated with Vast Information Architecture.

Software AG of North America, Inc.
11800 Sunrise Valley Drive
Reston, Va. 22091
Adabas
Number installed 2,200
Type.............Fourth-generation language/relational DBMS
Hardware.............All IBM mainframes and plug compatibles, DEC VAX
Hardware size ....Medium to large mainframe
Price .... $65,000-$172,000

Continued on next page

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HYPERBOLE

Product Spotlight/DBMS

MINICOMPUTER AND MAINFRAME DBMS

Adabas is an inverted file DBMS with support for relational-like flat files and multiple indexes. Principal strengths include efficiency in execution (good benchmarking record) and storage (data compression) and sophisticated programming capabilities.

Software House
1000 Massachusetts Ave.
Cambridge, Mass. 02138
System 1022
Number installed 426
Type.............Fourth-generation language/ DBMS
Hardware......................... Decsystem-10
Hardware size .... Medium to large mainframe
Price .... $22,500-$72,000
System 1022 supports hierarchical and network structures through use of inversion and has own high-level language as well as calls from procedural. Also has an integrated report writer with sorting, control breaks and automatic pagination. Query language uses an English-like syntax.

Software House
System 1032
Number installed 270
Type................................ Inverted DBMS
Hardware.................................. DEC VAX
Hardware size .... Superminicomputer
Price .... $8,000-$115,000
Fourth-generation language features integrated nonprocedural English-like query, report writer, automatic forms generation, application generator and data dictionary.

Sybase, Inc.
2910 Seventh St.
Berkeley, Calif. 94710
Dataserver/Dataworkbench
Number installed ....New product, 1986
Type..............................Relational DBMS
Hardware............. DEC VAX, VMS; Stratus
Hardware size ....Minicomputer to mainframe
Price .... $25,000-$125,000
Dataworkbench is a set of visual tools for report and application development, querying the data base and updating the data dictionary. The technology incorporates data base machine architecture implemented in software.

Teradata Corp.
12945 Jefferson Blvd.
Los Angeles, Calif. 90066
Data Base Computer/1012
Number installed 24
Type........... Relational data base machine
Hardware............Parallel microprocessors
Hardware size .... Large microcomputer
Price ....$325,000 and up or $11,000-$15,500 per month
Large-scale data base machine designed for high-performance, relational applications. Operates with IBM mainframes (MVS, VM). System can be shared among multiple mainframes with same or different operating system. Software with the system includes DBC/SQL, a sequel clone, full relational DBMS with active data dictionary/directory and a report writing facility.

Ultimate Corp.
717 Ridgedale Ave.
East Hanover, N.J. 07936
Ultimate
Number installed 4,000
Type..............operating system, relational DBMS
Hardware...............Honeywell, DEC-based machines without board, Pick-based operating system
Hardware size ...Minicomputers, microcomputers, superminicomputers
Price .... $20,000-$500,000
The Ultimate operating system is an enhancement of Pick Systems' Pick and is compatible with it. Existing Pick applications can be run on Ultimate. Data base structure supports variable length files, records, fields and subfields.

Unify Corp.
Suite 255, Building C
4000 Kruse Way Place
Lake Oswego, Ore. 97034
Unify
Number Installed 20,000
Type.............Fourth-generation language/ microcomputer DBMS
Hardware....................Unix micros, minis, Microsoft MS/DOS version
Hardware size .... Microcomputer to mainframe
Price .... $995-$80,000
Multiuser, menu-driven interactive relational DBMS that can support data bases spread across up to eight physical devices. Includes menu-driven forms generation, data entry and reports; SQL query language; C and Cobol interfaces; security system.

Wang Laboratories, Inc.
One Industrial Ave.
Lowell, Mass. 01851
Pace
Number installed 425
Type.............Fourth-generation language/ DBMS
Hardware............................ Wang VS line
Hardware size ....Minicomputer to superminicomputer
Price .... $17,000-$34,000
Pace runs on Wang VS Systems 15 through 300 with Wang OS 6.2 or later. The data base is a true relational model that allows interactive/information center access by selecting options from a menu.

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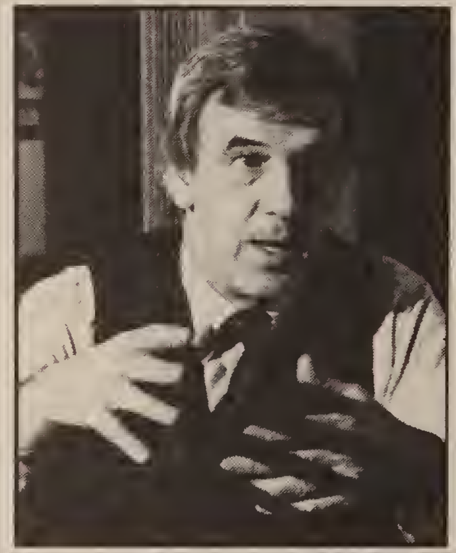

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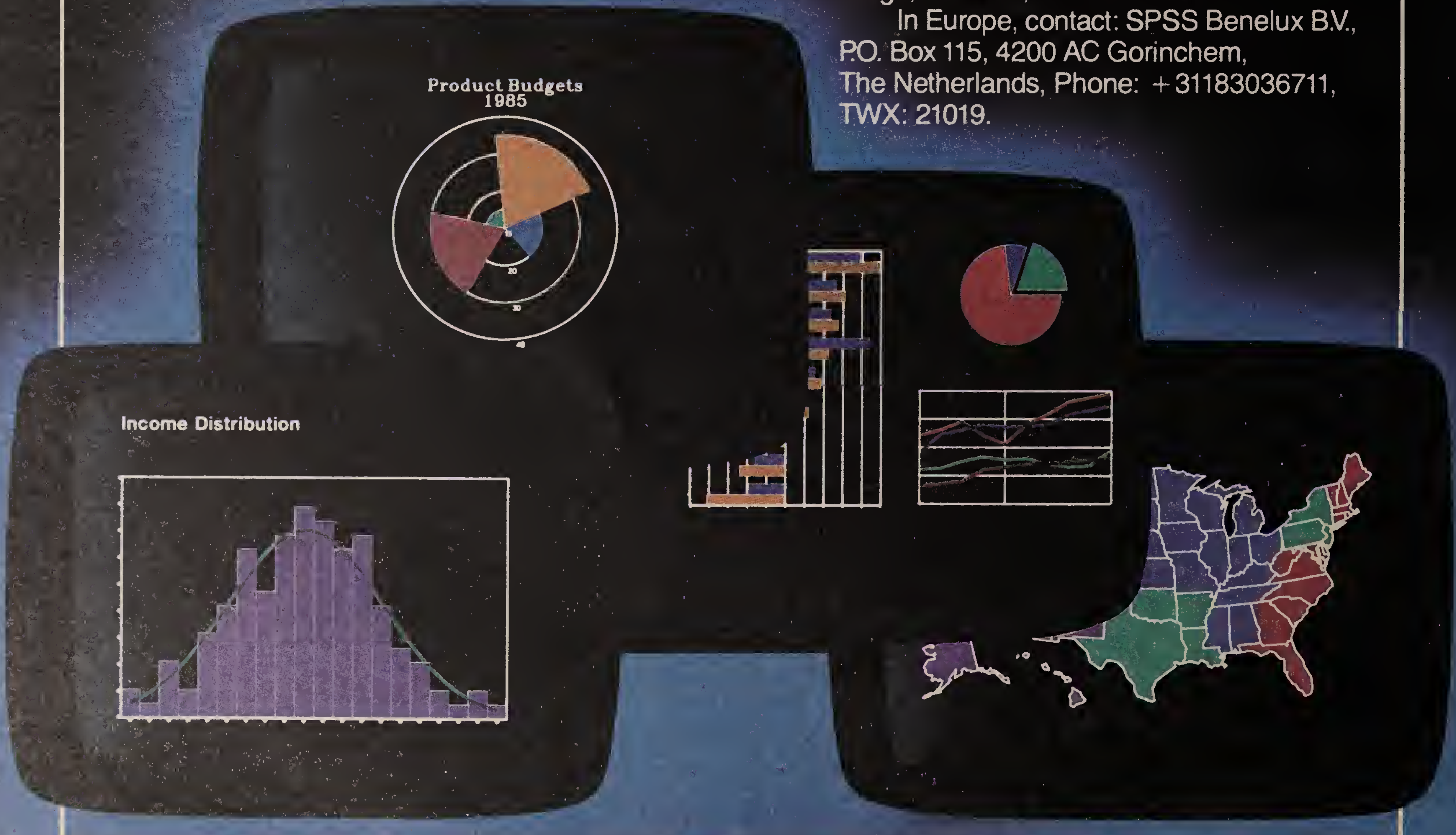

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In Depth

Cobol restructuring engines clean up spaghetti code

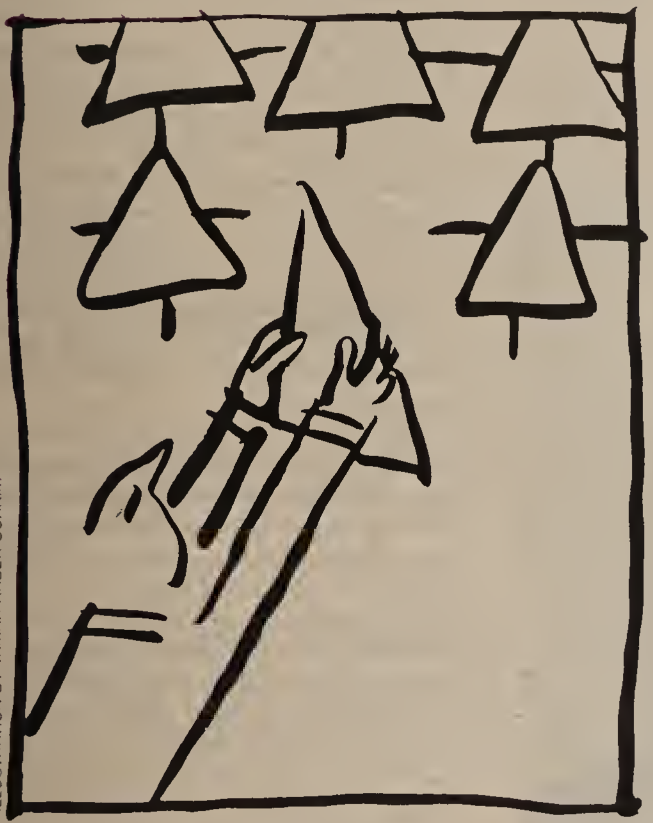

ILLUSTRATION BY TAMAR HABER SCHAIM

People put U.S. companies into the software maintenance mess, and people will clean it up. Cobol restructuring engines, which can reduce maintenance costs by as much as 50%, may be the catalysts.

By GIRISH PARIKH

Program restructuring is just beginning to enter the vast and relatively unexplored world of software maintenance. The restructuring engine is likely to become one of the most practical tools for DP personnel because of its ongoing usefulness in program maintenance.

Ever since researcher Guy de Balbine developed a restructuring engine in the early '70s to restructure Fortran programs, the concept of automated software restructuring has excited managers who must deal with old, problematic unstructured software. However, in spite of the popularity of structured programming in the '70s and early '80s, automated restructuring did not catch on.

With the advent of Cobol restructurers, especially IBM's recent entry into the marketplace, the idea of automated restructuring seems to be surfacing. In the world of Cobol restructuring, Peat, Marwick, Mitchell & Co.'s Structured Retrofit offered the first commercial service and, in time, the first restructuring tool.

Later entrants in the Cobol restructuring race include Group Operations, Inc.'s Superstructure, developed by Bill Morgan; Language Technology, Inc.'s Recoder, developed by Eric Bush; and IBM's Cobol/SF developed by Rick Linger and his team.

In this discussion, these four products and services are presented chronologically based on the dates of their introduction into the marketplace.

Structured Retrofit

At the heart of the Structured Retrofit process is the Cobol structuring engine designed by J. Cris Miller, developer of the first commercial Cobol restructuring engine and a pioneer of tool-based maintenance concepts.

The structuring engine turns unstructured Cobol code into structured, functionally identical code. The restructuring process removes all ALTER statements, PERFORM-THRU and FALL-THRU logic; eliminates dead code; restricts GOTOs to local loops; repackages the program into a hierarchical structure; and isolates and consolidates all I/O.

Structured Retrofit uses an automated assembly line process, consisting of the following steps:

Score. A static analysis and management reporting tool called Pathvu highlights unexecutable code, use of ALTERs and GOTOs, levels of logical nesting and software structure and so on.

The old program is analyzed by Pathvu, which determines if manual intervention is required. For example, if there is a runaway path, it should be fixed before restructuring.

Compile. Retrofit takes a working but unstructured Cobol program and produces a functionally equivalent structured Cobol program.

Review. If the first steps have highlighted compile errors, significant structural issues or dead code, they should be reviewed and fixed immediately.

Format. Using the formatting software tools, the readability of the code is improved.

Recompile. The new structured program is then recompiled to ensure that it is clean of diagnostics.

Optimize. Using object code analyzers, the hardware runtime performance of the new code is improved.

Validate. After completing the retrofit process, the restructured program is validated to ensure that identical inputs produce the same outputs as the old program did.

Superstructure

Using a Cobol program as an input program, Superstructure produces a new, functionally equivalent output program that is organized into a series of modules executed from a mainline routine by a hierarchy of PERFORM statements.

Superstructure retains the original flow of the program with which the programmers are familiar while reorganizing it into a structured program. The tool offers a number of options:

- It can reorganize the performed modules in executional sequence for those who prefer to work with such architecture.
- It can change or retain paragraph and data names and reformat the

---

Parikh is a Chicago-based consultant specializing in software maintenance and productivity. His books include There Is a Fortune to be Made in Software Maintenance *(Shetal Enterprises, Chicago, 1985) and* Handbook of Software Maintenance *(John Wiley & Sons, New York, 1986).*

program for better readability and understanding.

- Superfluous prefixes and suffixes from paragraph names can be stripped off.

In the process of restructuring, Superstructure does the following:

Eliminates interparagraph GOTOs. GOTOs that loop within a paragraph remain.

Eliminates fall-throughs.

Converts dead code to comments.

Corrects PERFORM range violations.

Removes ALTER statements and altered GOTOs.

Outputs list the restructured program. There are two optional outputs: a listing of the input (unstructured) program and a structured program output file.

Also produced in the beginning of the structured source listing is the "Superstructure scorecard," giving the management summary of key statistics related to the structuring process.

This scorecard profiles selected structure criteria and lists, for the old unstructured program and new restructured program, the count of features such as interparagraph GOTOs, fall-throughs, performed procedures, altered GOTOs, ALTER statements and lines of dead code. This data gives an indication of the improvements in the restructured program over its unstructured counterpart.

Superstructure Release 5 provides an option to reorganize modules in top-down executional sequence. It supports both command-level and macro-level CICS statements in the same program. In addition, the new version provides expanded comment documentation for main line architecture.

Recoder

Recoder reads and analyzes any IBM Cobol program and writes a new, functionally equivalent structured program. The restructured program is characterized by top-down logical flow, with a main routine that gives the big picture and a hierarchy of subroutines that contain more and more detail.

The program also uses single-entry/single-exit blocks of code, which the program addresses in turn, never skipping wildly backward and forward using GOTOs or conditional GOTOs in IF statements, as in the old program.

In Recoder, the program structure is not a feature of source statements. Instead, it is achieved by reducing the program statements to mathematical form using normalized graphs of the program algorithm. This technique, called the directed flow graph approach, is used to model many complex processes in modern technology — critical paths, networks and traffic flow, to name a few examples.

Briefly, here's how Recoder works:

First, the unstructured program is translated into a mathematical form called an abstract syntax tree. This procedure is conceptually similar to diagraming a sentence.

Tree-to-tree transformations are then performed to reduce the types of control flow expression to a few simple types. When the tree is simple enough, it is transformed into a directed graph, a network-like structure that represents the control flow of the original program.

Successive passes of the tool over the graph recognize patterns in the network structure and reduce them to less complex patterns. This gradual simplification process ends when the overall topology of the graph represents a perfectly structured algorithm.

The structured graph is transformed into a new syntax tree representing a structured program. Several additional transformations are now performed to improve the readability of the final code.

When the final syntax tree is reached, a Cobol code generator creates a new program that conforms to the abstract syntax. Because each transformation along the way preserves functionality, the new program is provably equivalent to the original. The user can select options, such as level of nesting, type of operators, complexity of expressions, formatting style, representation of procedures and so on.

Programs restructured by Recoder do not use GOTOs, ALTERs, SECTIONs, PERFORM-THRUs and fall-throughs.

In addition to the restructured program, Recoder creates a structure chart of the new program. The structure chart documents the new program's modularity and reveals its top-down structure. The chart helps in understanding the program and serves as a useful tool for training and maintenance.

Cobol/SF

Cobol/SF transforms the spaghetti logic of an unstructured Cobol program into a structured Cobol program with top-down hierarchical code. The restructured programs are single-entry/single-exit programs that contain no GOTOs or ALTER program statements.

Cobol/SF is one of the first software maintenance products to use artificial intelligence. According to the vendor, it makes use of AI techniques that involve the use of production, or IF-THEN, rules. The production rules are drawn from the definition of the Cobol programming language and from structured programming principles.

Each production rule by itself can only recognize a particular pattern in the input Cobol program. Any part of the Cobol program matching the recognition pattern is then transformed into a new pattern. When many such rules are collected and allowed to act on the Cobol program in combination, the resulting process can produce a structured program

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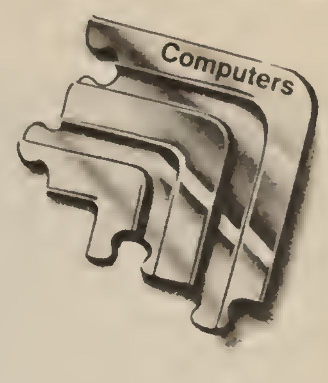

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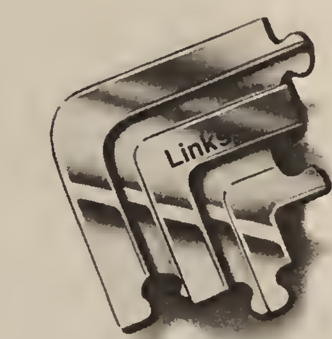

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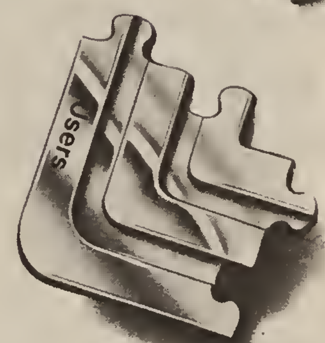

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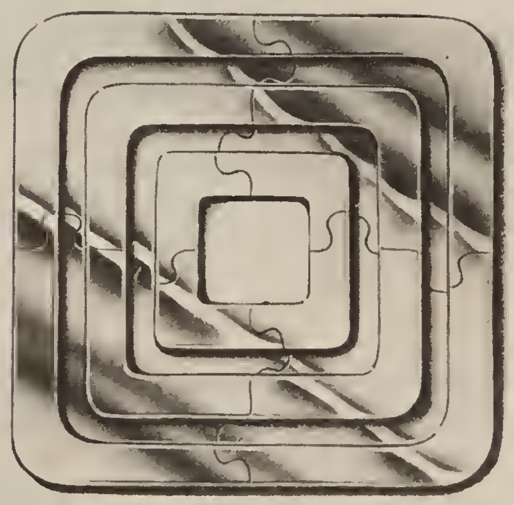

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Cobol restructuring products and services

	Structured Retrofit	Superstructure	Recoder	Cobol/SF
Vendor	Peat, Marwick, Mitchell & Co. The Catalyst Group 303 E. Wacker Drive Chicago, Ill. 60601	Group Operations, Inc. 1110 Vermont Ave. N.W. Washington, D.C. 20005	Language Technology, Inc. 27 Congress St. Salem, Mass. 01970	IBM 1 Culver Road Dayton, N.J. 08810
When Introduced	Service: 1980, Product: 1985	Product: 1983	Service: 1984, Product: 1985	1985
Number of Users*	100+ (no breakdown of product and service users available)	75 site licenses	7 licensed sites 100 service customers	Not available
Largest Program Restructured	42,000 lines	31,000 lines	Service: 32,000 lines Product: 30,000 lines	15,000 procedure division lines
Hardware Configurations	*Service:* IBM, Burroughs, Wang, Honeywell, Sperry, TI, HP, DEC, Harris, CDC *Product:* IBM mainframes and compatibles (OS, DOS, VM, TSO, CMS); Wang VS series; IBM Personal Computer and compatibles (detuned); Honeywell; Burroughs	IBM (OS, VM/CMS and MVS) Some non-IBM programs	IBM (OS/MVS)	IBM 370, IBM 4300 series or IBM 3030 series, 3080 series or 3090 series (MVS, TSO or VM/SP, CMS)
Language(s) in which the Package is Written	Cobol	Cobol with assembly language routines	PL/I	PL/I
Product Design	Bohm-Jacopini technique Pushes and factors to stratify (not flatten) Avoids switches and replication	Ashcroft-Manna technique	Graph theory (formal language theory) No particular structured methodology used, but output is top-down, hierarchical, tree-structured.	*Structured Programming: Theory and Practice* by Linger, Mills and Witt (Addison-Wesley Publishing Co., 1979)
Training	Retrofitting Cobol programs (two days) Maintaining retrofit code (one day) Additional courses on software maintenance management, software tools and software engineering	A half-day training session and workshop for each site at no charge; process repeated once a year at no charge for customers who are on maintenance schedules	One-day training after signing service/license contract; train the trainer approach	2½-day workshop on planning and managing conversion projects
Price	Service: 25 - 79 cents/line of code Product: $100,000 - $115,000 depending on configuration	Product: $33,000 for up to three CPUs per site	Service: 10 - 50 cents/line of code Product: $150,000 for three-year license	Product: one-time charge of $125,000 or monthly charge of $12,500
Trial Period	30 days	30 days for restricted number of programs	5,000 lines	30 days
Support and Maintenance	Hot line available	Maintenance included for first year; renewed for 12% of license fee	Maintenance included for three years with license; renewed for 15% of current price	IBM licensed program; toll-free product support hot line available

* Anyone running one program on a service basis could be considered a user.

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                                      QUOTA       SALES        %
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        Executive Furnishings         $ 800.00    $1650.54   206.31
        Specialty Furnishings         $ 500.00    $ 851.00   170.20
        Upholstered Office Furn       $1000.00    $ 932.20    93.22
TOTAL   FOR PATRICIA JACKSON          $2300.00    $3433.74   149.29

85      JOHN BRIGHT
        Specialty Furnishings         $ 500.00    $1251.00   250.20
        Georgian Home Line            $1500.00    $2532.20   168.81
        Executive Furnishings         $ 800.00    $1216.36   152.04
        Upholstered Office Furn       $1000.00    $ 916.20    91.62
        Colonial Home Line            $1500.00    $    0.00    0.00
TOTAL   FOR JOHN BRIGHT               $5300.00    $5915.76   111.61
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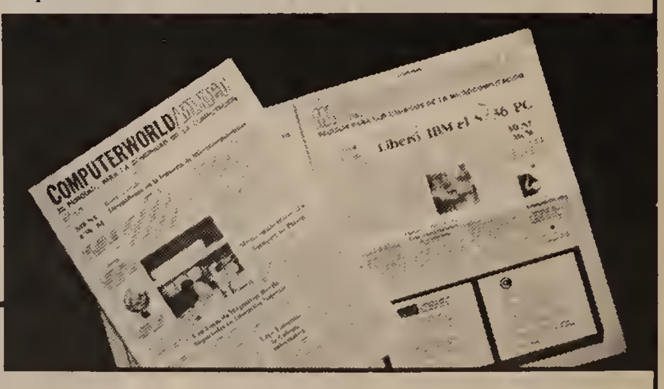

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resembling one created by a programmer.

According to the vendor, the product is useful for reducing software maintenance, facilitating program reengineering and enforcing structured programming standards during new development projects. Cobol/SF can restructure any Cobol program that compiles without error in VS Cobol II, IBM's version of ANSI Standard Cobol 85, and contains no real-time interface code, such as CICS.

The first three steps of the following six-step restructuring process involve program analysis of the existing unstructured program. The last three produce a structured, well-documented version of the program.

Preparation of an unstructured program. If the existing program is not already in VS Cobol II syntax, it must be converted. Also verify that Cobol/SF syntax is satisfied.

Analysis mode. Cobol/SF analyzes the existing program and generates a reengineering report that describes the transformation it can make to the existing program. It also identifies any problem area in the input program for analysis and review.

Optimization of an unstructured program. You can redesign or reorganize any logical knots in the code to help make the final program more usable. This can result in improvements in the structured output.

Generation mode. The process that occurred in analysis mode is repeated, this time using the improved input program. Then, a structured output program is produced, guided by selected controls on structuring and formatting.

Documentation of structured program.

Verification of a structured program.

User experiences

Sharon Girulat, director of the development support center at Combined Insurance Co. in Chicago, selected Structured Retrofit after comparing its output with those of Superstructure and Recoder. She had two basic requirements for selection: One was that the physical appearance of the restructured program should be such that the programmers understand the flow; the second was that all the inputs and outputs should be isolated in the program.

The old, flat, file-oriented programs will be converted to operate in a Cullinet Software, Inc. IDMS environment. Separation of inputs and outputs will enhance programmer productivity in this conversion.

Because of the initial effort for setting up the process and learning curve, Girulat says she expects a 10% software maintenance savings on the first few programs restructured. In the long run, with more programs restructured, she expects the savings will increase to 25%. She adds that 2% to 3% of the programs will need manual intervention in restructuring; this may vary according to the conditions of the programs in different environments.

Liberty Mutual Insurance Co. in Boston finds Superstructure, installed there since 1984, useful in restructuring spaghetti code that imposed maintenance problems.

According to Paul Mooney, the company's systems manager, the department identified 50 real spaghetti programs, some 20 years old, that ran well in production but turned into a nightmare when modifications were required. In addition, moving the company's DP operations to Portsmouth, N.H., in 1980 resulted in a loss in programmer continuity.

While the DP department was about to start rewriting some of the programs, it heard about Superstructure. After testing the program to see whether it could help defer rewrites, the department installed it and, in a few months, had restructured the 50 programs. As a result, the DP department has found more free time for development.

According to Mooney, the applications' logic was easier to follow in restructured programs. Liberty Mutual will eventually rewrite many of the programs but only in response to functional needs, not because of maintenance problems.

In a trial run, Len Foster, senior staff analyst at Tampa, Fla.-based GTE Data Services, Inc. restructured two Cobol programs, totaling 2,000 lines, using Recoder and Superstructure. Programmers worked for several months on programs restructured by both companies and found programs restructured by Recoder easier to work with than those restructured by Superstructure.

As a result, GTE Data Services licensed Recoder. Foster expects that the automatically restructured programs with Recoder will help reduce software maintenance costs. GTE Data Services plans to restructure one million lines of Cobol code this year.

Reaping benefits of restructuring

Restructured programs reduce software maintenance costs and improve maintenance programming productivity. Some users of structured technologies report that structured software reduces software maintenance costs up to 50%. Presumably, such software was designed using a structured technique.

But can the restructuring of the old, poorly structured and inadequately documented software yield the same benefits when automatically restructured? Can the benefits realized by one user of a restructuring product or service be achieved by other users as well? Will a product fit into a particular organization's environment and culture?

Here is a way to select a product or service that is right for a specific environment: Restructure one complex, medium to large Cobol program with all four products. Let four programmers — all with about the same experience and competence and with

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> ***A restructuring engine, however capable and intelligent, will not replace human insight and perception. The engine will aid in understanding software, which is generally a prerequisite for modifying software correctly. But the effectiveness of this aid will generally depend on the condition of the old software.***

the necessary training in understanding restructured programs — work on them, performing the same maintenance assignments for a few days. A fifth programmer can continue to do the same assignments on the old, unstructured program.

This process will resemble a contest, and each programmer will try to excel. Ground rules should be established, and the results should be carefully recorded and evaluated to help measure the quantity as well as the quality of a programmer's (or a programming team's) work.

The above test should be done on more than one program whenever possible to improve the accuracy of the selection process. It is easy to see that selecting the right product can make a substantial difference in ongoing savings in software maintenance costs.

The above project will cost a small fortune. So why bother to do it? Because the stakes are enormous. Worldwide investment in Cobol totals $100 billion, according to estimates by International Data Corp., a Framingham, Mass.-based market research firm.

Most of these programs are unstructured and undocumented, and IBM estimates that maintenance programmers spend one-half of their time understanding programs.

The time programmers take to understand the program, or its parts, in order to do an assignment can also be included as a criterion in productivity measurement for the project.

Intelligent restructurers

The first generation of Cobol restructuring engines was based primarily on the function-structured programming techniques developed by scientists such as Corrado Bohm, Giuseppe Jacopini, Edsger Dijkstra and Harlan Mills.

However, data-structured programming techniques, such as logical construction of programs/logical construction of systems pioneerneered by the French systems scientist Jean Dominique Warnier, can prove to be more powerful in software maintenance as well as in development than the functional techniques.

The "logical retrofit engine," based on Warnier's concepts, can help standardize software maintenance work nationally, saving U.S. companies billions of dollars.

Artificial intelligence will be used more often in software maintenance with advances in the AI-based restructuring technologies, including possible future "intelligent restructurers." Other potential areas of research and development include automated restructuring of programs in other languages and migration to higher level languages and to modern software or hardware technologies.

Of course, training to make the most of the tool is essential. Also, structured programming standards and guidelines based on the selected product should be developed.

A restructuring engine, however capable and intelligent, will not replace human insight and perception. The engine will be an aid in understanding software, which is generally a prerequisite for modifying software correctly. But the effectiveness of this aid will generally depend on the condition of the old software.

It was people, in spite of their best intentions, who got us into the maintenance mess; and it will be people, aided by powerful tools, techniques and training, who will clean up the mess. Restructuring engines may well be the catalyst. ■

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Users fine-tune 4GL strategies

MIS goes on the defensive when vendors and experts call Cobol a poor performance choice. But corporate users find 4GLs perform better only in certain environments, and some major corporations choose 4GLs for only 5% of the staff.

By JAMES JOHNSON

MIS vice-president: We have been researching fourth-generation languages and may soon implement the selected product for all development. I would like you to review our logic and comment on the proposed strategy.

Consultant: What have you learned from the research?
MIS vice-president: Well, first, improving productivity during the development cycle is a high priority. A pilot project indicated a 3:1 productivity gain over Cobol, our standard procedural language. Also, maintenance is now almost 60% of the system development resource; a fourth-generation language should reduce the percent significantly.

Consultant: Anything else?
MIS vice-president: Yes, fourth-generation language capabilities have matured. In addition to ad hoc reporting, they now support graphics, simulation and data base update. Also, we feel CPU consumption can be controlled via tuning.

Consultant: Do your end users write their own reports?
MIS vice-president: Yes, most do, and we support this trend.

Consultant: Do end users develop small, less-than-one-man-year systems on their own with a fourth-generation language?
MIS vice-president: Yes, in most areas.

Consultant: Are your corporate applications highly integrated and tailored?
MIS vice-president: Yes, very much so. You should see our system integration chart showing all the data and file interfaces.

Consultant: How about productivity aids for your standard procedural language — are they extensively developed?
MIS vice-president: We have a state-of-the-art operation utilizing on-line edit, compile and debug. Structured code has been used for years, and code is copied whenever possible.

But your questions don't relate to the assignment I hired you for. They are organizational issues. Let's talk about whether or not we should use a fourth-generation language for all future applications based on technical factors such as language capability, CPU requirements and productivity.

Consultant: Let me explain my logic. . .

This dialogue illustrates factors normally not related to an MIS division's fourth-generation language strategy. Are the consultant's questions about user responsibility, system integration and existing productivity techniques legitimate? Why are there no follow-up questions on the traditional issues of development productivity and CPU consumption?

Hallmark Cards, Inc. maintains a conservative strategy toward fourth-generation languages, limiting their use to a small percentage of its MIS staff. The company initiated a project to define the factors influencing this strategy. Clarifying these factors, Hallmark hoped, would allow it to reconcile its rule of limited use with other strategies employing a more liberal deployment of

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Johnson is director of systems development at Hallmark Cards, Inc. in Kansas City, Mo. He is the author of Managing Productivity in DP *(QED Information Sciences, Inc., Wellesley, Mass. 1980).*

4GL strategy decision matrix

Technical Issues	Yes	No
Is development time a priority? *Is maintenance consuming an increasing percent of the staff?*	System complexity, as defined by percent of procedure code, is the key variable vs. a yes or no answer. For simple and some more complex systems, a fourth-generation language may reduce development time and maintenance requirements.	
Is CPU consumption a main criterion?	Tuning is possible except in very high-volume situations.	Should be considered
Are the language capabilities comprehensive? Each language has strengths, but many cover total MIS requirements (ad hoc reporting, file definition, graphics, batch reporting, screen generation).	May be used for entire system	Utilize language's strength (ad hoc reporting, graphics, screen generation and so on).
MIS Organization Issues		
Are applications highly integrated?	Language not used to greatest advantage with highly integrated systems	Consider language for independent applications.
Limited prototyping environment?	Benefits limited	Prototyping is good use of language.
Are multiple productivity aids implemented for existing nonprocedural language?	Benefits reduced	Potential for improved productivity
Corporate Organizational Issues		
Do end users write their own reports (batch or on-line)?	Since language utilized by end users, MIS need minimized	MIS should consider language for reports.
Do end users develop and install small systems (less than one man-year) with the language?	Since language utilized by end users, MIS need minimized	MIS should consider language for small systems.
Do end users demand tailored systems?	Not recommended for complex systems	Consider for straightforward systems.
Is obtaining an additional CPU a problem?	Not recommended	Should be considered

The questions in this decision matrix consider technical, MIS and corporate factors that influence decisions to use a fourth-generation language. Depending on a yes or no answer, recommendations for devising strategies are given.

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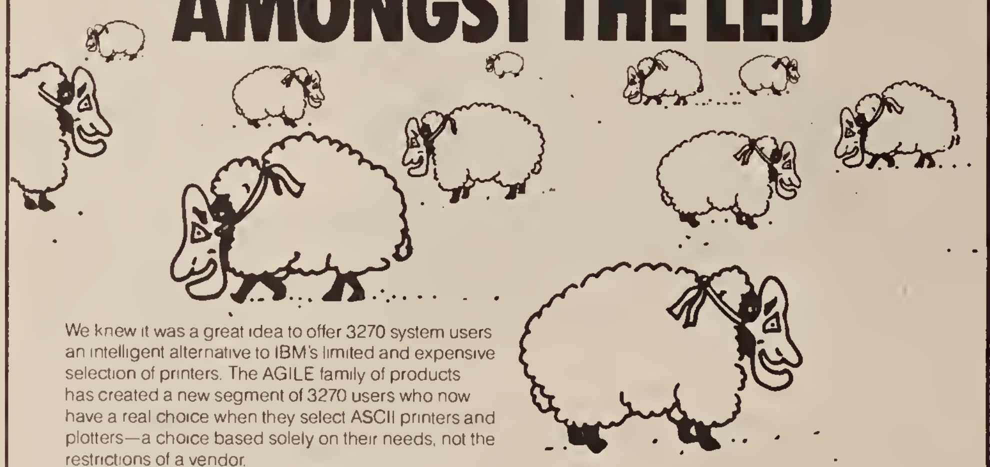

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fourth-generation languages, such as the strategy used by a division of PPG Industries, Inc.

While PPG's strategy of rewriting all of its systems in Cincom Systems, Inc.'s Mantis resulted in a 35% improvement in overall MIS productivity, Hallmark sought to answer one question: Is this strategy practical for us and other corporations?

A decision matrix — a tool for developing or refining a fourth-generation language strategy — can aid the analysis of various strategic factors, such as programmer and maintenance productivity and CPU and language capabilities. This matrix allows diverse strategies for different corporations and concludes that organizational issues, not technical ones, dominate the strategy selection.

Hallmark's own experience is based on five years of Martin Marietta Data Systems' UFO development, limited work with Information Builders, Inc.'s Focus, extensive end-user support of report writing with Informatics General Corp.'s Mark IV and Execucom Systems Corp.'s Interactive Financial Planning System (IFPS).

Selected accounts of personal experiences were supplemented by an informal survey of MIS managers with a variety of responsibilities. The survey obtained data and comments on languages used, percent of MIS staff using fourth-generation languages, CPU concerns, strategies for employing fourth-generation languages and maintenance requirements. The focus centered on technology issues, since those were judged to be of primary importance at the time.

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> ***To argue CPU performance or delivery time without considering the complexity of development is misleading.***

The companies selected possess varying degrees of fourth-generation language experience. Fifteen companies returned the completed form, including American Cyanamid Co.; Bell Canada; Bethlehem Steel Corp.; Burlington Industries, Inc.; Coca-Cola Co.; Duke Power Co.; Johnson & Johnson; Monsanto Co.; and Ralston Purina Co. The survey base is composed of relatively large companies — more than half reported systems development staffs of more than 100 people.

After reflecting on the survey's diversity, a pattern emerged that related the strategies used with the technical and organizational environment of each company. This view was verified during a seminar presentation of the survey results. More than 50 companies participated in the group discussions; representative comments are presented here.

Variety of strategies

Fourth-generation language strategies define who, when and how the languages are used in a corporation. In the course of the project, there emerged a collection of strategic rules, such as the following:

- Use packages first, fourth-generation languages second and no third-generation languages.
- Wait for fifth-generation languages while investing in third-generation productivity aids.
- Separate all report-writing functions organizationally, and employ a fourth-generation language for this purpose.
- Use a third-generation language for complex reports and batch processing and a fourth-generation language for simple and medium reports.
- Make decisions on fourth-generation languages on a system-by-system basis, using processing characteristics as the criteria.

As expected, the survey confirms that a variety of strategies exist among corporations: Seven organizations reported less than 20% of the staff using fourth-generation languages, while four organizations noted more than 60% of the staff using a fourth-generation language. Why the disparity occurs — a more difficult question — was not answered directly by the survey.

As an example of the selection process, consider some survey responses to the question, "What is the basis for determining if an application should be written in a fourth-generation language?"

"In our installation, all new applications are fourth-generation or higher level languages unless purchased."

"The MIS staff has a list of strengths and weaknesses for the fourth-generation language tools. The MIS staff also consults with the development center to make appropriate language selections."

"Judgment based on apparent size and complexity of application. Use limited strictly to simple applications."

Obviously, among corporations, a spectrum of fourth-generation language strategies exists — from developing all applications in a fourth-generation language to limited or no use of those languages. Who is right? What are the relevant factors? Users trying to determine the correct fourth-generation strategy to use should consider the following criteria.

Productivity issues

Is development time a priority? Fourth-generation language development productivity is dictated by the amount of procedure code required. Fourth-generation languages dramatically reduce development time for simple applications, but this advantage decreases as more procedure code is required. Thus, to argue CPU performance or delivery time without considering the complexity of development is misleading.

Is maintenance consuming an increasing percent of the staff? Maintenance productivity follows a similar pattern as that of determining development time.

In James Martin's book *Application Development Without Programmers* (The Telecom Library, New York, 1982), a 58-line Cobol program calculating the mean of a set of numbers is replaced by one line of Nomad code: READ DIGITS LIST AVG (DIGITS) — an impressive demonstration of the power of fourth-generation language nonprocedural code. However, another side to the productivity issue exists that is substantiated by Hallmark's experiences, its survey and other sources.

Basically, fourth-generation

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Novell broke out of the local area networking (LAN) pack nearly four years ago with the introduction of the file server. We called it a LAN milestone. Others scoffed. Three years later, when IBM announced that its LAN systems would be file server-based, the rest of the pack finally headed for that first milestone.

But Novell was already milestones ahead. By porting the NetWare® LAN Operating System to 30 major LAN hardware configurations and offering over 3,000 NetWare-compatible multiuser applications, Novell had established a de facto LAN standard. A standard now utilized by more than 200,000 NetWare users worldwide.

With the introduction of System Fault Tolerant (SFT) NetWare, Novell passed another LAN milestone: affordable fault tolerance for nearly all LAN systems. And the rest of the pack is only beginning to talk about reaching that milestone down the road.

Moving Ahead.

Today, Novell isn't resting. On past achievements or anything else. While other companies are struggling to reach Novell's LAN milestones, Novell is forging an even bigger lead in LAN technology, systems and service. A lead so big that many major LAN competitors are now buying Novell technology just to stay in the race.

Being a leader is hard work. But Novell is in front to stay. Because nothing compares to the view from the front. Especially when you look forward to the milestones ahead.

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Milestones Ahead.

language productivity, either in development or support, is dependent on the amount and clarity of the procedure code — code necessary when the automatic parameters are not sufficient.

The key fourth-generation language variable — complexity — is the ratio of procedure code to total code required for the program or system. For simpler systems, fourth-generation language productivity considerably exceeds Cobol; many documented projects support a productivity ratio of 5:1.

As the ratio of procedure code to total code, or complexity, increases, the fourth-generation language advantage diminishes; for complex applications, Cobol, because of its flexibility and structure, rates higher in productivity.

The development project productivity chart (see opposite page) graphs productivity ranges for fourth-generation languages and Cobol, the predominant third-generation language. The Cobol lines of code are realistic for Hallmark and generally are substantiated by comparisons with other corporations and available literature.

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> ***The most important survey response emphasizes this point: Use fourth-generation languages for simple applications. Six responses to the question, "Do you feel programs written in fourth-generation language are easily supported?" affirmed, "Yes, if they are simple."***

The average number of lines of code per man-day for all projects is 75. This relatively high value is obtained by using productivity aids such as on-line compile, on-line debug, copied code and subsecond response time.

Complexity for Cobol is a relative measure (since it is 100% procedure code) based on a combination of project innovation, technology and size. Average productivity increases 50% on each step from complex (50 lines of code) to medium (75 lines) to simple (112 lines).

The most important survey response emphasizes this point: Use fourth-generation languages for simple applications. Eight companies indicate that the basis for writing an application in a fourth-generation language is simplicity. Six responses to the question, "Do you feel programs written in fourth-generation language are easily supported?" affirmed, "Yes, if they are simple." Other companies noted that productivity with fourth-generation language depends on complexity:

"Varying degrees of productivity can be realized, depending on the complexity of applications. . . . Fourth-generation languages were not intended to be used for complex applications."

"Complex requests are very difficult to support when problems arise or enhancements are requested."

"If the system is complex, the productivity gains will be less."

This is not the first time this concept has been documented. An October 1984 study by Framingham, Mass.-based market research firm International Data Corp., "Fourth-Generation Language: Information Generators to Meet Information Needs," states that large integrated systems required expert skill for fourth-generation languages but lesser skill for Cobol.

It further states, "Fourth-generation languages and Cobol are fundamentally different, and organizations should not make the mistake of viewing these two types of programming methods as interchangeable."

A presentation by the Guide IBM users group included a similar chart showing the productivity of fourth-generation languages (IBM's DMS and ADF) decreasing with increased complexity, and complex fourth-generation language applications having less productivity than Cobol. Thus, complexity is the significant variable determining productivity within the development and maintenance process.

Consumption an open issue

Is CPU consumption a main criterion? The next technical factor, CPU consumption, introduces controversy as illustrated by the following survey comments:

"Ungoverned usage of fourth-generation language in both MIS and user areas has dramatic impact on CPU resources. Further, the implications of this usage for future information activities create concern regarding our ability to integrate systems effectively."

"Minor machine overheads are far overshadowed by productivity gains."

CPU consumption is an open issue, especially for high-volume transactions. One study concludes that 10 end users running Focus simultaneously consume 76% of an IBM 3081 Model G's CPU capacity, an uncomfortable result for computer operations managers.

On the other hand, eight survey respondents said they do not experience excessive fourth-generation language CPU use. Only four companies noted CPU consumption as a

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problem. The paradox can be explained by one of the following:

- Performance tuning is possible in most situations.
- Simple programs inherently use small amounts of CPU resources.
- In some environments, the CPU resource is not a constraint.

Assuming the survey presents a representative sample, excessive CPU use normally does not constitute a problem unless transaction volumes are extreme.

Strengths and weaknesses

Are the fourth-generation language capabilities comprehensive — each language has strengths, but many cover total MIS requirements? Although all popular fourth-generation languages can be used to build complete systems, each language possesses strengths and weaknesses. Thus, if a comprehensive language is available, entire systems can be developed. If a more limited fourth-generation language is the option, exploit its strengths.

The following languages were considered typical fourth-generation languages: IBM's ADF; Focus; Applied Data Research, Inc.'s Ideal; IFPS; Software AG of North America, Inc.'s Natural; Martin Marietta Data Systems Ramis II; and UFO. Distinguishing fourth-generation languages as application generators, primarily for MIS professionals, or very high-level languages, primarily for end users, may be academic, since almost all fourth-generation languages are examples of both.

The survey did not attempt to document specific fourth-generation language characteristics such as ad hoc query, graphics, simulation, report generation or data base update; however, the languages listed generally share four capabilities:

- They allow interactive development and testing.
- They provide nonprocedural (what vs. how) coding.
- They interface with various data bases.
- They increase productivity by as much as five times that of Cobol (as measured in function points or equivalent lines of code).

MIS organizational issues

MIS organizational issues address application integration, prototyping and current productivity on third-generation languages.

Are applications highly integrated? Extensive integration implies complexity and thus reduces the fourth-generation language advantage.

Limited prototyping environment? Prototyping provides a sound reason for using a fourth-generation language; however, third-generation languages may also be used successfully.

Are multiple productivity aids implemented for existing nonprocedural language? For the issue of existing productivity aids, take the extreme example of a relatively small organization, with 30 systems development personnel using batch Cobol, in which the line-of-code productivity falls in the low range for the three complexity levels shown in the project productivity chart.

In this case, potential exists for significant productivity gains, and a fourth-generation language may provide the best approach. Thus, the incremental productivity increase for a fourth-generation language depends on current third-generation language productivity. The PPG Industries example mentioned earlier illustrates this situation.

The training and support aspect of introducing a new language should not be minimized. A critical mass of expertise and cross-training is a requirement. To a degree, the amount of this support argues for a strategy based on organization, such as certain project groups heavily utilizing a fourth-generation language vs. the entire staff using it occasionally.

Two organizational aspects excluded from the decision matrix deserve mention. First, high turnover rate is not considered a factor because it affects all strategies adversely — even packaged software is difficult to maintain without expertise. Second, the negative attitudes of MIS management and programmer/analysts toward technology was not judged valid.

Although some argue that MIS personnel do not accept fourth-generation languages based on resistance to change, the results of the survey and subsequent discussions with a variety of corporations do not substantiate this claim. In fact, the opposite may be true — managers may be too quick to base change on inflated expectations.

Corporate issues

Do end users write their own reports? Do end users develop and install small systems with a fourth-generation language? The extent of end-user computing is a primary corporate organizational issue. If end users assume responsibility for writing reports and installing small systems, then MIS is responsible for generally complex "backbone/core" systems. Thus, fourth-generation languages are of reduced benefit to MIS but of direct benefit to end users.

Do end users demand tailored systems? If end users expect highly tailored systems from MIS, fourth-generation languages are not recommended because procedure code is required for the tailoring process.

Is obtaining additional CPU a problem? Another issue addresses the corporate philosophy toward computer acquisitions. Does the company provide ample CPU capacity so that utilization is not a primary concern? If so, fourth-generation languages are recommended for simple and medium complex systems.

Changing viewpoints

Although the majority of this discussion examines technical issues, specifically productivity and CPU consumption, the questions on MIS and corporate organizational issues are more important when establishing a successful fourth-generation language strategy.

In major corporations, a continuum of fourth-generation language strategies exists, ranging from less than 5% to 100% of the programming staff using fourth-generation languages. Traditionally, technical factors preoccupy MIS when searching for a fourth-generation language strategy, but it is now evident that an organization's environment should be the primary influence on corporate fourth-generation language strategy.

Returning to the opening conversation:

Consultant: Now, do you see how my earlier questions relate to your fourth-generation language strategy?

MIS vice-president: Yes, based on my answers to the decision matrix questions, fourth-generation languages are recommended for specific functions such as prototyping.

With our organizational structure and integrated, complex applications, it is best to stay with our third-generation language and concentrate on productivity aids. However, at our primary subsidiary, the environment is entirely different.

Consultant: What are its needs?

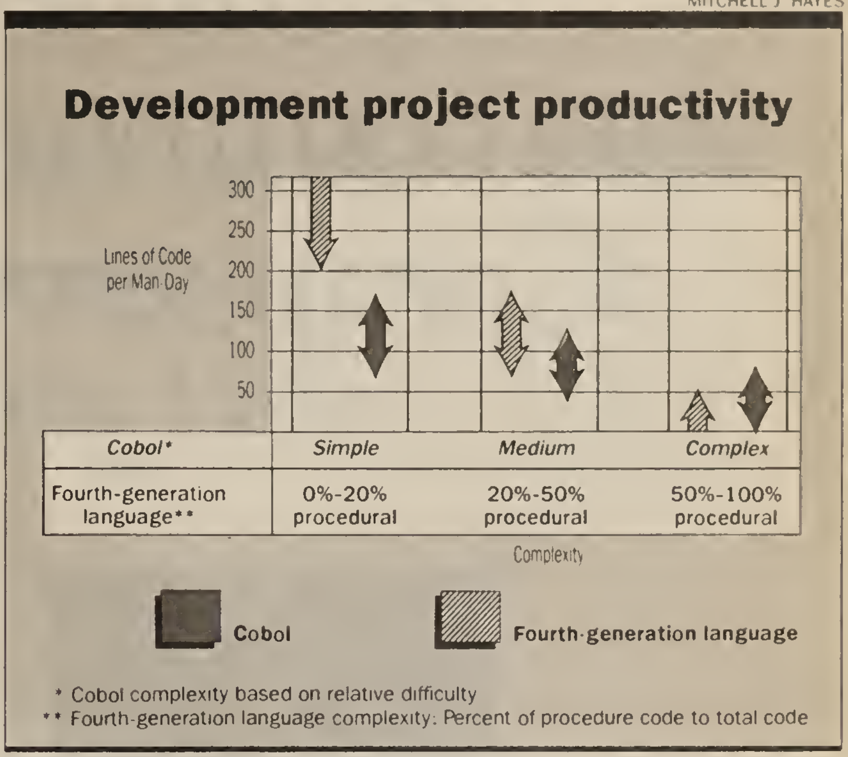
MIS vice-president: It is growing rapidly and needs a variety of different systems as soon as possible. End users will accept "standard" systems; also, the company has adequate CPU capacity.

Consultant: A strategy of first purchasing packaged software and, when doing so is not possible, developing systems exclusively in fourth-generation language sounds reasonable for the subsidiary.

MIS vice-president: I agree. The right strategy varies depending on the corporate environment. Companies need to analyze technical issues but, more important — the firm's environment — before establishing a strategy.

Consultant: The paradox of diverse but equally successful fourth-generation language strategies finally can be reconciled. ■

MITCHELL J HAYES



As the complexity of program development increases, the fourth-generation language advantage diminishes.

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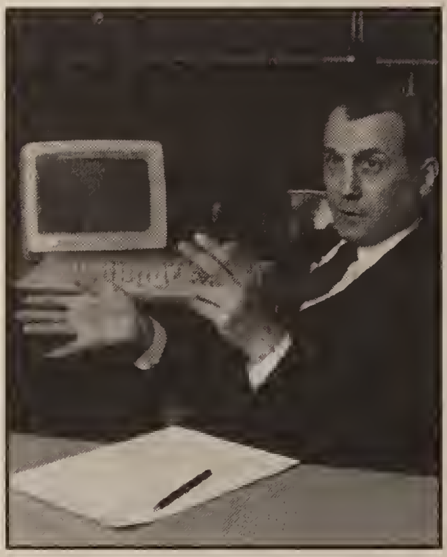

Infotron Systems is a manufacturer of statistical and time-division multiplexers, network concentrators, intelligent switching systems, and network management systems. To Ed DiMingo, Director of Corporate Communications, it's important for Infotron to have high visibility among data communications professionals. So when Infotron introduced its newest product, the InfoStream™ 1500 T1 voice and data multiplexer, he chose Computerworld as the major vehicle for getting the message to the right people — network managers, voice and data managers, and MIS/DP directors.

Ed explains just how he knows their message is being read. *"I put together a list of data communications buyers and influencers. And for the past two years, I've polled these people to find out what they read most. Computerworld always leads the way. In fact, in the most recent study, Computerworld came in way above the others at 68%, with Datamation at 51% and Data Communications at 23%."*

In fact, Ed's own readership studies were reinforced by results of a recent Starch study. *"Our InfoStream ad ranked in the top 10 percentile for 'read most' among all advertisements studied in the issue. There's a real need for T1 information in the communications field among Computerworld's readers, and our message got to these people."*

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NEW PRODUCTS

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TI adds Travelmate series terminals to Silent 700 line

Texas Instruments, Inc. of Dallas has announced the addition of the TI Silent 700 Travelmate series of portable display terminals to its Silent 700 family.

TI's portables can be programmed to provide customized solutions for users.

The Travelmate series includes the Travelmate, the Travelmate 1200 and the Travelmate DT. All three offer user interface modules that, according to the vendor, can be programmed to provide customized solutions for users' needs. The interface modules are plug-in application cartridges that provide 32K bytes of read-only memory and 24K bytes of random-access memory per cartridge.

All three standard Travelmate terminals are said to feature a retractable, 16-line by 80-column LCD screen, built-in 45 char./sec. thermal printer, full-size keyboard, data communications interfaces and specific application and text editing functions.

The Silent 700 Travelmate and Travelmate 1200 were designed for portable data communications applications. They come with internal 300 and 300/1,200 bit/sec. AT&T-compatible modems, respectively. The Travelmate DT was designed for desktop applications in which the terminal has direct connection to the host computer system via the RS-232C interface said to support up to 9.6K bit/sec. communications.

The Travelmate terminal costs $1,095; the Travelmate 1200 lists for $1,295; and the Travelmate DT costs $995, the vendor stated.

Videophone system bows from Pictel

Pictel Corp. of Peabody, Mass., recently introduced a videophone system incorporating its proprietary video image compression technology.

The system is said to include Minx videophones and a network controller manufactured by Datapoint Corp. According to the vendor, the system can support seven terminals in a star configuration network.

Pictel executives claimed that their proprietary video coder/decoder computer will transmit high-quality images and voice over low-cost 56K bit/sec. transmission lines, such as AT&T's Accunet Switched 56 Service.

A spokesman stated that Pictel's Motion Compensated Transform compression algorithm measures and compensates for changes in motion, reducing the system's need to regenerate images of moving objects.

Voice is transmitted over a separate audio line.

Software able to be upgraded

According to a spokesman, Pictel offers an advantage over earlier videoconferencing products by being software upgradeable. With the Pictel system, users will be able to plug in a software card to gain future enhancements, he explained.

The commercial product will operate at 52K bit/sec. over full-duplex digital lines and will operate at faster speeds with improved quality over dedicated and T1 lines.

The product will be available by the end of the year at a cost of $150,000 for a system including five Datapoint terminals, a local-area network connecting terminals within a building and the video coder/decoder.

The Datapoint terminals accommodate IBM Personal Computers and compatibles, but the system is not currently capable of transmitting data, the spokesman said. He added that graphics can be compiled on a micro, and pictures of the graphics can be transmitted.

DEC introduces LG family

Two line matrix printers available for text, graphics

Digital Equipment Corp. of Maynard, Mass., has introduced the LG family of printers, including the LG01 for text and the LG02 for text and graphics.

The LG01 and the LG02 are said to be 600 line/min line matrix printers. According to the vendor, the LG01 offers data processing and correspondence-mode printing as well as multiple char./in. print selections. It is said to be compatible with both existing U.S. and European character sets.

The LG02 text/graphics printer reportedly offers the capability to create bar codes, custom forms and logos; superscript and subscript modes; and prints in landscape mode. In addition, the LG02 printer provides all of the text capabilities of the LG01 printer, the vendor stated.

According to a spokesman, the number of moving, mechanical parts of both printers has been reduced, providing electrical reliability. The vendor also claimed that the printers require no scheduled maintenance calls.

Both printers are said to be compatible with DEC VAX computers from the VAX 8600 to Microvax II systems as well as with the company's Micro/PDP-11/73, Micro/PDP-11/83 and Micro/PDP-11/84 computer systems.

The LG01 costs $11,950. The LG02 costs $14,000.

True Basic's enhanced language supports Hercules' graphics card

True Basic, Inc. of Hanover, N.H., has released a new version of the True Basic Language System to support advanced graphics for the Hercules Computer Technology Co. monochrome graphics card.

True Basic's Hercules support is said to incorporate all the features of the standard True Basic language system. According to a spokesman, True Basic is the first language that allows Hercules graphics users to access 640K bytes of memory and the Intel Corp. 8087 processor.

Using True Basic with the Hercules monochrome card, users can develop applications in 720- by 348-pixel resolution on the IBM monochrome display, according to the vendor.

True Basic's graphics syntax is said to be hardware independent, similar to the Graphical Kernel System graphics standard, so graphics developed using the Hercules card are directly portable to systems supported by True Basic's other adaptations for the IBM Color Graphics Adapter, Apple Computer, Inc. Macintosh and the Commodore Business Machines, Inc. Amiga.

The Hercules support package is available as an optional upgrade to registered True Basic users for $39.95.

The full package, including the Language System and the Hercules support, costs $189.

HP library implements GKS

Hewlett-Packard Co. of Palo Alto, Calif., has introduced a two-dimensional graphics library that is said to be an implementation of Level 2B of the industry-standard Graphical Kernel System (GKS).

The HP-GKS library was designed for use with HP 9000 technical computers and graphics hardware under the HP-UX operating system.

It is a tool that applications developers can use in drafting, process control, mapping, simulation analysis and presentation graphics. The applications developed may achieve performance up to 50,000 2-D vector/sec. on high-performance graphics display hardware.

Features of HP-GKS include output primitives such as polyline, polymarker, text, cell array and fill area; segment operations that can be used to create, copy, associate and delete segments; metafile input and output defined using the GKS metafile format; attribute binding that allows the attributes to be specified individually for each primitive or bundled together; tables that can be defined for general use; and input operations that are available for six classes of input in request mode.

HP-GKS is said to support a dynamic workstation configuration and provide device-independent access to graphics workstations. In addition, applications that have already been written to the GKS standard are portable to the HP 9000 systems.

HP-GKS for the HP 9000 Series 200/300 costs $1,000. HP-GKS for the HP 9000 Series 500 costs $3,000.

SOFTWARE & SERVICES

Systems software

Mitchell Associates, Inc. has released a new version of the Salford University FTN77 Fortran 77 compiler, the **FTN77I**.

The version offers an l-mode code generator and options for lX-mode code and global optimization. The FTN77I is supplied in executable program format and is suitable for systems running the Prime Computer, Inc. Primos operating system, Revision 19.4 and higher.

First-year licenses range in price from $5,000 to $6,000. Subsequent yearly fees range from $800 to $950.

Mitchell Associates, P.O. Box 6189, San Rafael, Calif. 94903.

Wayne-Bradley, Inc. has announced **Operator Management System 1** for the Wang Laboratories, Inc. VS family.

The software provides menu creation and maintenance with unlimited menus for an unlimited number of users.

The menus are said to allow the setting of printer defaults for class, mode and form number for each program.

According to the vendor, it monitors and logs program executions by all system users for any duration of time and provides on-line inquiry of logging information for quick viewing of usage and hard-copy reporting on demand.

Operator Management System 1 costs $1,995.

Wayne-Bradley, Suite 250, 315 E. Robinson St., Orlando, Fla. 32801.

Advacate Corp. has announced the **PEM3000**, a plant and equipment maintenance system for the Hewlett-Packard Co. HP 3000.

PEM3000 is said to provide inventory, purchasing, fixed asset and accounting functions.

Features reportedly include handling recurring maintenance and unscheduled work orders, providing unlimited remark lines, allowing for user-assigned standard service parts for each order, tracking labor and material costs, comparing estimates with actual costs, calculating percentage complete and hours remaining, providing a maintenance cost history of each asset and notifying when planned work must be scheduled.

PEM3000 costs $17,500.

Advacate, Suite 208, 7999 Knue Road, Indianapolis, Ind. 46250.

Applications packages

Management & Accounting Control System has introduced its **Management and Accounting Control System** (MACS), originally designed for Digital Equipment Corp. VAX computers, for the DEC Microvax.

The MACS system is said to provide order processing, production and financial control. Specifically, its functions are inventory control, purchasing, payables, receivables, order processing, sales analysis, general ledger, payroll, bills of materials and materials requirements.

MACS offers more than 450 Cobol programs and 250 reports. It is licensed for $4,500.

Management & Accounting Control System, Suite 400, 323 E. William, Ann Arbor, Mich. 48104.

■

Radian Corp. has added **CPS/RAS** to its CPS family of contour mapping software systems.

CPS/RAS is said to provide Digital Equipment Corp. VAX and IBM computer users with interactive two-dimensional and three-dimensional color mapping of petroleum and gas reservoirs as well as gridding operations.

It reportedly enables users to build complete models of oil and gas reservoirs.

CPS/RAS prices start at $60,000.

Radian, P.O. Box 9948, 8501 MoPac Blvd., Austin, Texas 78766.

Utilities

Davis, Thomas and Associates, Inc. has introduced **DTA/Cobol** and **DTA/Recov**, programs for IBM mainframe users.

DTA/Cobol is said to aid IBM VSE users in software maintenance and debugging. It provides information on the source listing and rearranges the entire listing. It automatically reformats and replaces the original Cobol listing on the DOS Power queue.

DTA/Recov is a CICS/VSAM forward recovery system for use while updating VSAM files in a CICS/VS environment. It operates on DOS or OS and can reportedly recover multiple files at the same time.

DTA/Cobol costs $4,800. A renewable license is $240 per month. DTA/Recov costs $3,800 for DOS and $5,600 for OS. A renewable license is $190 per month for DOS and $280 per month for OS.

Davis, Thomas and Associates, 8800 Highway 7, Minneapolis, Minn. 55426.

■

Atlantic Technologies, Inc. has announced **Eztools Paint**, a graphics screen painting and sketching software tool for Computervision Corp. computer-aided design and manufacturing systems.

Eztools Paint is said to allow users to edit and enhance picture images originally created with Computervision Image Design 1 software; to touch up CADDS2 drawings by removing hidden lines or by adding text, labels, dimensions and annotations; and to paint graphics on the screen using a palette of mixable colors.

A single-user system of Eztools Paint costs $9,800.

Atlantic Technologies, P.O. Box 605, Woburn, Mass. 01801.

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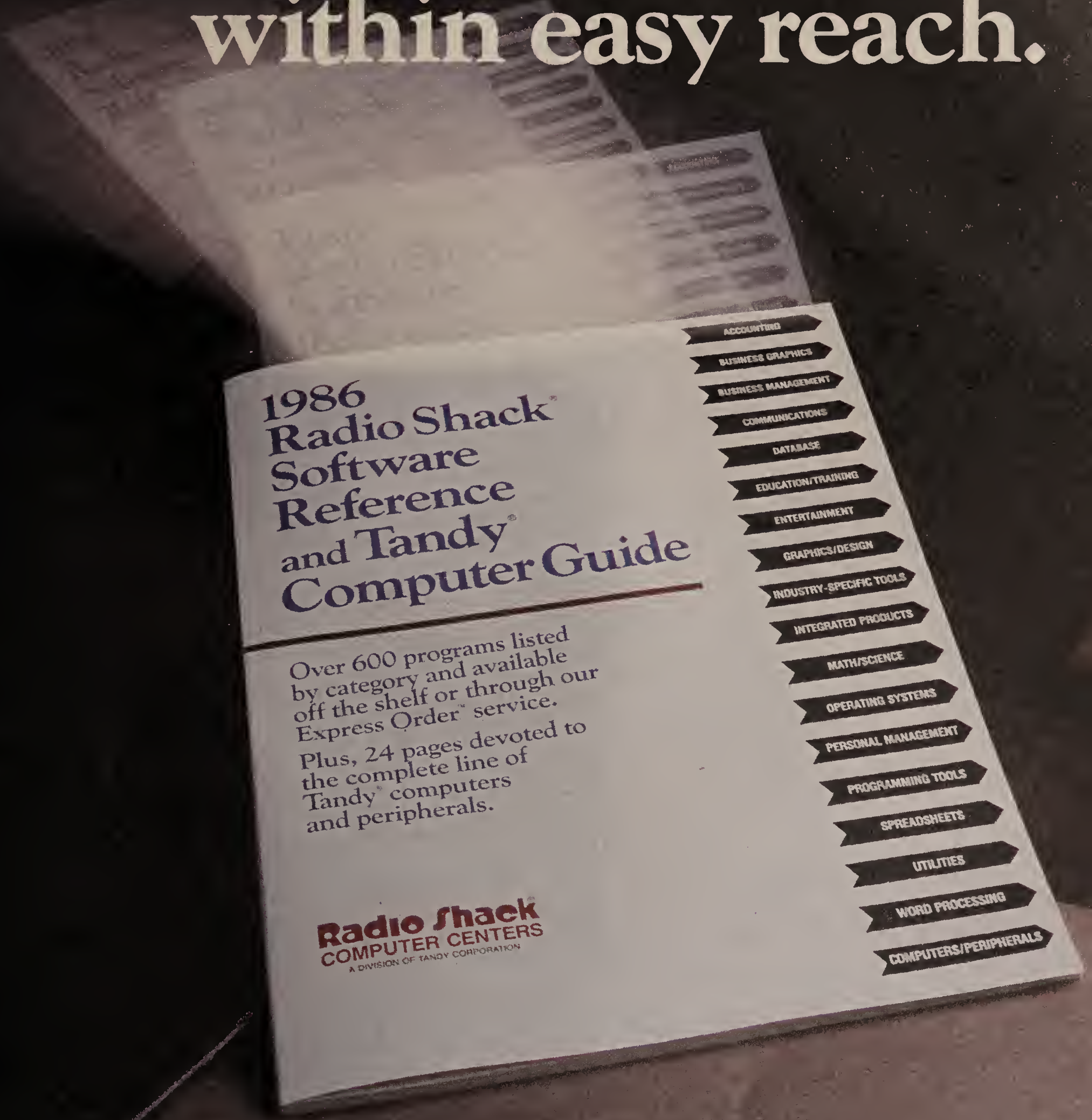

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There are over 70 pages packed with programs, including top-sellers like *Symphony,* and hard-to-find titles like *The Precedent Legal Accounting System.* Many of these programs are available off the shelf, or you can order through our Express Order service. Visit a Radio Shack Computer Center today. It's your one-stop software store.

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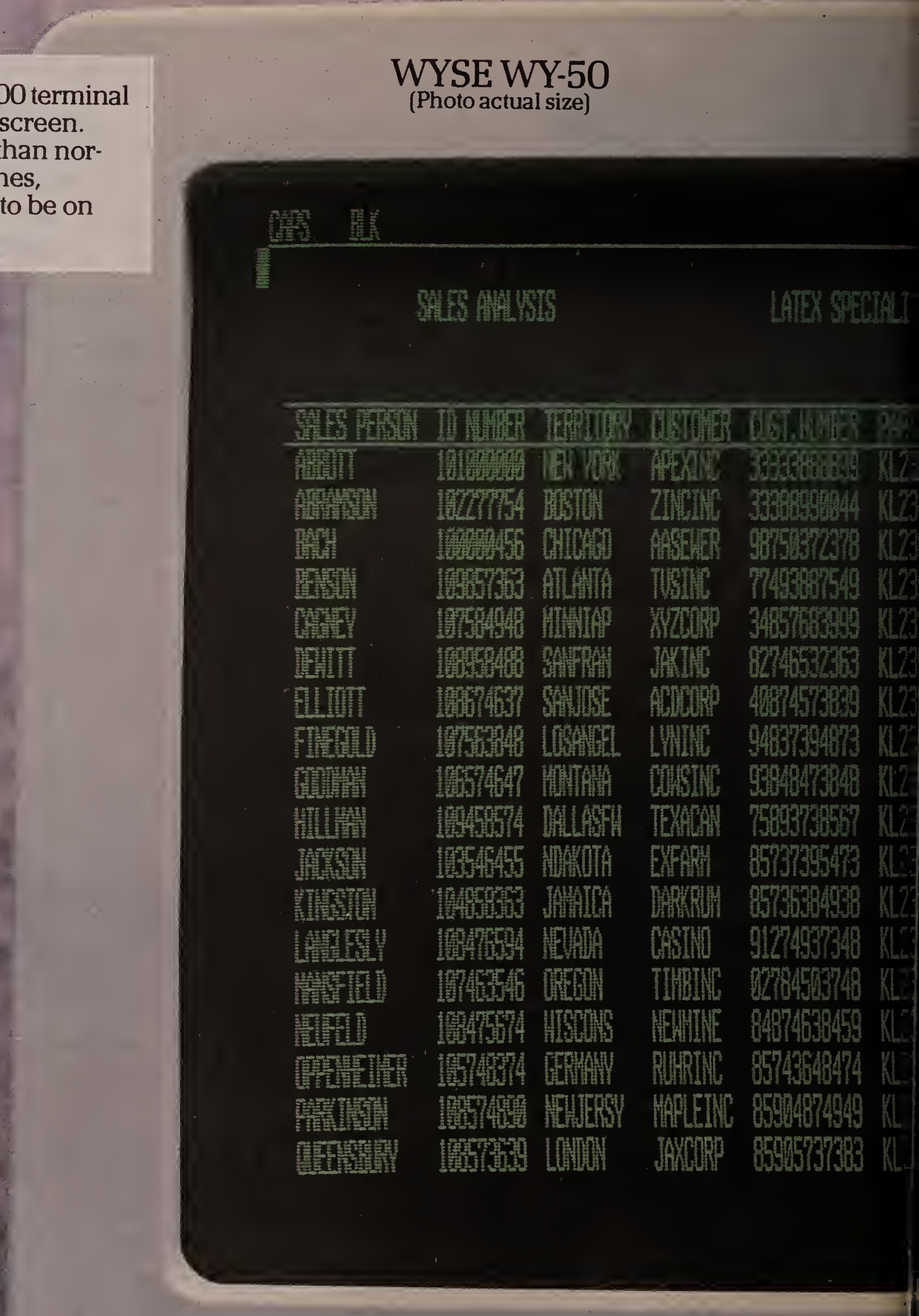

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HILLMAN       109458574  DALLASFW   TEXACAN   75893738567  KL2
JACKSON       103546455  NDAKOTA    EXFARM    85737395473  KL
KINGSTON      104858363  JAMAICA    DARKRUM   85736384938  KL2
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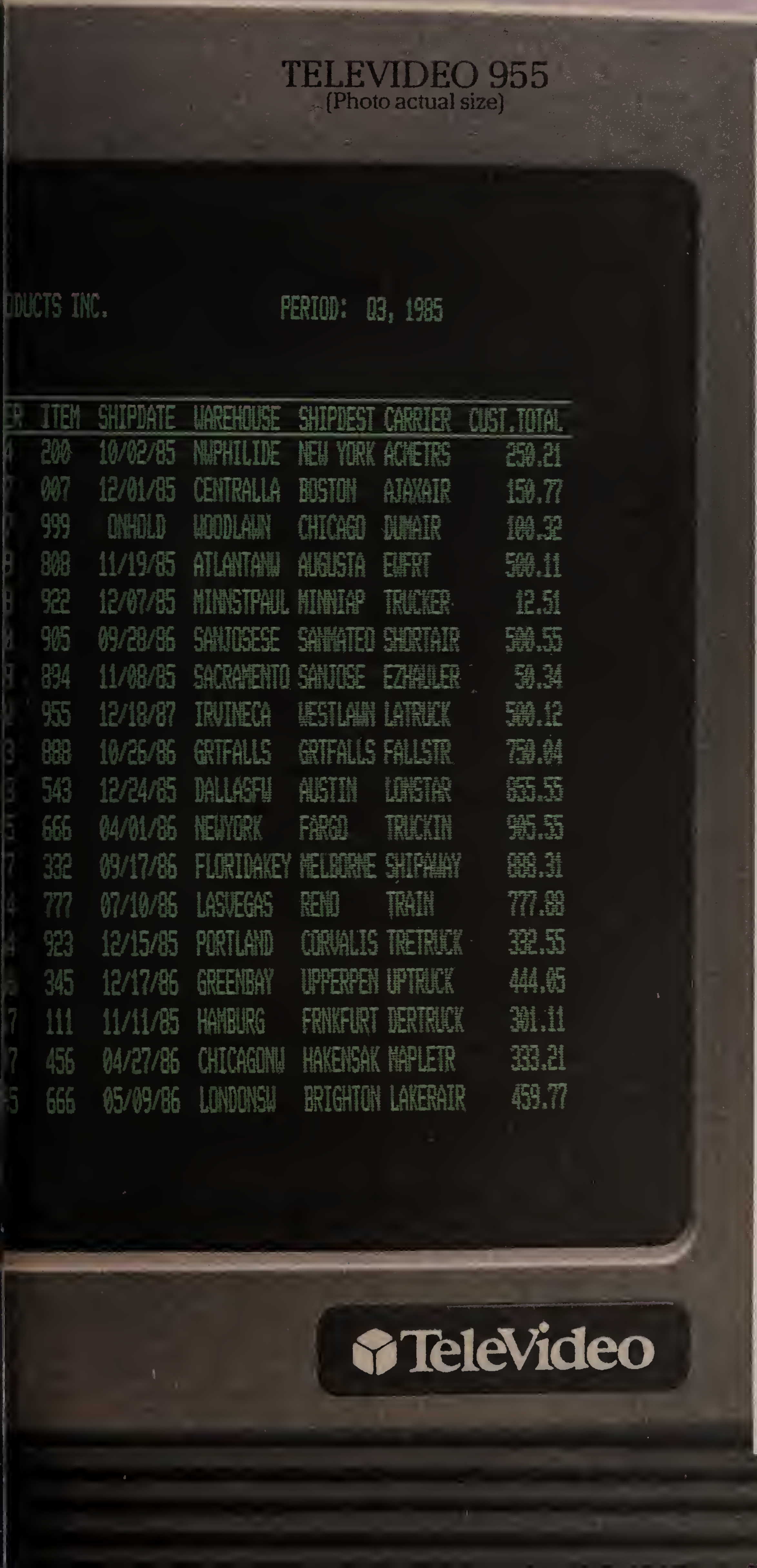

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  999    ONHOLD   WOODLAWN    CHICAGO  DUMAIR        100.32
  808   11/19/85  ATLANTANW   AUGUSTA  EWFRT         500.11
  922   12/07/85  MINNSTPAUL  MINNIAP  TRUCKER        12.51
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Data base management systems

Software Research, Inc. has added the **Data Entry** and **Menu** modules to its **Fasport-DBM** family of information management products.

The Data Entry module is said to offer the user a method of building data bases from previously entered information.

The Menu module provides a way of linking and controlling various programs of an application.

Fasport-DBM runs on any Convergent Technologies, Inc. CTOS-based computer. As a package it costs $1,200. The Data Entry module alone costs $500, and the Menu module costs $100.

Software Research, Suite 210, 1991 Crocker Road, Cleveland, Ohio, 44145.

Training software

Advanced Systems, Inc. has announced the **SAS Library** of five computer-based training courses for users of SAS Institute, Inc. SAS software.

The library includes SAS, a prerequisite that covers the basic capabilities of SAS software; SAS/FSP, presenting methods for editing, browsing and printing SAS data sets; SAS/AF, introducing users to the SAS Applications Facility; SAS: Graphics; and SAS/ETS for using planning and forecasting facilities.

The courses are available under various pricing options. A library rental plan ranges from $50 to $150 per module per month.

Advanced Systems, 155 E. Algonquin Road, Arlington Heights, Ill. 60005.

MICROCOMPUTERS

Systems

GW Instruments has added the **Macspeech Lab** to its Macadios product line.

Macspeech Lab is said to turn the Apple Computer, Inc. Macintosh into a speech analysis workstation for purposes of studying human speech and testing the speech impaired. According to the vendor, it can produce spectrograms.

The Macspeech Lab workstation consists of the GW Instruments Macspeech Lab software, priced at $300, the Macadios hardware, priced at $2,500, and the Apple Macintosh computer.

GW Instruments, P.O. Box 547, Cambridge, Mass. 02142.

Trilobyte Computer Corp. has announced the **Trilobyte V/PC**, an industrial NEMA 4 environment for a Zenith Data Systems Corp. Z-158 personal computer.

The V/PC was designed for severe industrial and field mobile environments where humidity/hose off, corrosive gases, conductive particles and other unfilterable contaminants are present.

It uses the Zenith passive backplane with all logic on standard plug-in modules. The basic system includes processor, memory and multifunction board and occupies two Zenith slots.

Base systems with Zenith Z-158 single-floppy system installed are priced at $9,950. The chassis alone costs $5,995.

Trilobyte, 801 W. Grand Ave., Oakland, Calif. 94607.

■

MAI Basic Four, Inc. has announced the **MAI 1500**, a multiuser business Basic computer system.

The MAI 1500 is said to be a fully integrated IBM Personal Computer AT-compatible system. It features an Intel Corp. 80286 microprocessor with an 8-MHz clock; a 1.2M-byte, 5¼-in. floppy disk drive; 640K bytes of internal memory; a 20M-byte hard disk; an RS-232C serial port; an IBM-compatible parallel printer port; and an AT-style keyboard.

The system can accommodate up to three users. Many options are available including a 14-in. monochrome or color monitor and mass-storage devices.

The MAI 1500 base price is $4,750.

MAI Basic Four, 14101 Myford Road, Tustin, Calif. 92680.

Software applications packages

X-Y-See Software has announced **Profit Maps**, a graphics profit planning system for the IBM Personal Computer and compatibles.

Profit Maps features a three-step process: It sets up an analysis, does the arithmetic and translates the results into pictorial maps.

Profit Maps requires an IBM PC or compatible with color/graphics board, 320K bytes of random-access memory and IBM PC-DOS or Microsoft Corp. MS-DOS 2.

It costs $495.

X-Y-See Software, 32097 Buffalo Park Road, Evergreen, Colo. 80439.

■

Computervision Corp. has announced the **Personal Designer Finite Element Modeler**, an applications package for its personal computer-based Personal Designer System.

The package is said to provide an interactive graphics environment similar to mainframe-based finite element modelers. It provides native geometry creation, editing capabilities and finite element modeling functions. The software interfaces with a variety of finite element analysis packages.

The package is available standalone or bundled with Macneal-Schwendler Corp.'s MSC/Pal.

Personal Designer Finite Element Modeler costs $1,500. With MSC/Pal2, it costs $2,500.

Computervision, 100 Crosby Drive, Bedford, Mass. 01730.

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NEW PRODUCTS/MICROCOMPUTERS

Human Management Systems, Inc. and **The Professional PC, Inc.** have introduced **Eric-II**, a human resource management system designed for cost/information analysis and projections.

Eric-II is said to provide support for affirmative action, employment, employee relations, employee health and welfare, records and employee demographics, labor relations, wage/salary administration, training and development. It includes more than 45 predefined reports plus a report writer.

Eric-II operates on an IBM Personal Computer or compatible with 256K bytes of random-access memory, a 10M-byte hard disk and a 132-col. printer.

It costs $995.

Human Management Systems, Suite 200, 12828 Northup Way, Bellevue, Wash. 98005.

Software utilities

Signum Microsystems, Inc. has announced **Documax**, a document management and text retrieval program for the IBM Personal Computer, Personal Computer XT, AT and compatibles.

Documax is said to perform full text searches of standard Microsoft Corp. MS-DOS text files and to compress text to 50% of its original length. Documax can search the full text of several files at a time at a rate of 100,000 word/min. using and, or and not logical relationships between arbitrary phrases. It compresses at a rate of 80,000 word/min.

It costs $150.

Signum Microsystems, 120 Mountain Ave., Bloomfield, Conn. 06002.

■

Software Enhancement Technology, Inc. has updated its **Hilite** utility for Ashton-Tate's Dbase III.

Hilite now offers Dbase III Plus compatibility as well as providing a way to incorporate more functional and visually appealing Lotus Development Corp. 1-2-3-style menus into Dbase III applications.

Hilite for Developers includes Hilite for Dbase III, design specifications and commented source code. It costs $149.95.

Hilite for Dbase III costs $99.95, and the Developers' Kit for upgrading from Hilite to Dbase III costs $49.95.

Software Enhancement Technology, P.O. Box 344, 390 Danbury Road, Wilton, Conn. 06897.

■

Phoenix Computer Products Corp. has announced **Pforce**, a library of object-oriented functions and subsystems for the C programming language.

Pforce is written in C and assembly language. It is available for compilers from Microsoft Corp., Lattice, Inc., Computer Innovations, Inc. and Wizard Computer Products Co. The product offers both high- and low-level functions said to be fully integrated, optimized, debugged and ready to use.

It also includes source code for all functions and supplied utilities, the vendor said.

Pforce costs $395.

Phoenix Computer Products, 320 Norwood Park S., Norwood, Mass. 02062.

Auxiliary equipment

Touchstone Technology, Inc. has announced the **Softswitch**, an automanual printer switch that reportedly uses embedded printer codes to direct the parallel output of any microcomputer between any two parallel printers.

Softswitch can be used as a manual A-B switch or as a fully automatic software-controlled or code-sensitive switch, according to Touchstone Technology.

The circuitry switches all active lines and passes all acknowledgments and status signals to make the device compatible with all personal computers and parallel printers, the company said.

Touchstone Technology, P.O. Box 24954, 955 Buffalo Road, Rochester, N.Y. 14624.

COMMUNICATIONS

Controllers

Compu-Mech, Inc. has added the **CD4150** remote terminal unit to its 2Wire line.

The CD4150 is said to provide a range of analog and digital I/Os via the serial port on a computer. It features eight slots for plug-in modules, random-access memory and electrically alterable read-only memory for data storage, RS-232, transistor-transistor logic and a 1,200 bit/sec. modem serial interface. Each unit has a switch-selectable address allowing 256 units to be placed on one communications channel. A fully configured CD4150 costs approximately $2,000.

Compu-Mech, Suite 75, 5242 Angola Road, Toledo, Ohio 43615.

Protocol converters

KMW Systems Corp. has announced the **Series III Twinax** and the **Series III Coax**, its Series III line of protocol converters.

Both the Series III Twinax and the Series III Coax offer three levels of on-board diagnostics, menu-driven programmability and pass-through mode for graphics data, the vendor said.

The Twinax allows attachment of local devices such as CRTs, printers and plotters to IBM System/34, 36 and 38 minicomputers. The 3287/Coax allows local attachment of non-IBM output devices to IBM 3270 cluster controllers.

Single-unit prices range from $1,000 to $1,500.

KMW Systems, 8307 Highway 71 W., Austin, Texas 78735.

With increasing competition, businesses are beginning to realize the necessity — and urgency — of becoming more productive. This, in turn, calls for greater office automation — and is creating a growing market for computer-related office products.

In May's Computerworld Focus, we deliver that market to you with an issue devoted to solving some of the most pressing office automation issues.

We'll focus on keeping up with new office automation technologies while meeting user demands. And provide experienced user strategies and tips to assist MIS/DP directors in bringing on new technologies without abandoning existing hardware and software.

Then we'll zero in on business graphics.

If you're in the graphics end of the business, you've got an even bigger reason to be in our May issue. We'll be discussing the latest trends in the market and the hottest technologies available. We'll see how traditional MIS/DP systems can be used for exciting graphics — and which applications are most beneficial. And, we'll help our readers make the right hardware and software decisions for their own special needs.

Reach the people you want most.

The people who'll be reading our office automation issue are the people you want most. 129,000 MIS/DP professionals who subscribe to Computerworld. Plus thousands of pass-along readers. Plus attendees at NCGA and NCC.

So, if you've got a product or service for the automated office, we've got the place to sell it.

May's Computerworld Focus issue on Office Automation.

But hurry, closing is April 4. For more information, contact Ed Marecki, Vice President/Sales, Computerworld Focus, 375 Cochituate Rd., Framingham, MA 01701, (617) 879-0700. Or call your local Computerworld sales representative.

Issue: May 14 - Closing: April 4

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Here's How Information Services And International Distribution Made It Happen

"Thanks to TELON, the new international on-line order entry system was completed six months early and within budget."

Ben Wolf
Director of Commercial Systems
Travenol Laboratories, Inc.

"Three years ago, my department received the mandate — create a new, international, on-line order entry system and deliver it within six calendar months. We calculated a minimum of twelve calendar months to build the system at a cost in excess of $115,000 using traditional development methods. The solution? TELON...the applications development tool that doubled our productivity almost immediately.

"The TELON pilot project created 50 IMS DB/DC programs, including order processing, on-line maintenance, billing interface, and invoice review. With a 2-to-1 productivity increase from detail design through string test, TELON delivered complex applications in record time and brought the project in with savings in excess of $60,000. The users, as expected, were delighted.

"In the three years since we installed TELON as the shop standard, we've added more than 700 IMS DB/DC programs to our production library and increased our maintenance productivity to about 5-to-1. TELON's powerful features fit our MVS/XA environment, and it even generates COBOL code and reusable MACRO statements. Training is rapid, and so is staff acceptance. In fact, the work itself is more interesting, challenging, and pleasant since TELON has been installed. With TELON, we have doubled our productivity without compromising commitments to existing systems and techniques we know have worked well.

"The benefits of working with TELON are substantial. Detail design, coding, and testing are reduced, so our overall timeframes are compressed by at least 50%. With quicker delivery of improved systems by smaller project teams, TELON has delivered a productivity payback that's corporate-wide."

"With TELON, we're doing more with less."

"We now process orders five times faster...and the reduced inventory overhead means the system paid for itself in just four months."

John Helpap
Director of International Distribution
Travenol Laboratories, Inc.

"Travenol ships over $200 Million in health care products to 96 foreign countries every year. When the world is your marketplace, the logistics are staggering. My department is called upon to coordinate inventory, order entry, shipping, language and currency translation on a daily basis. Under the old system, the pressure was enormous.

"Working with Ben's group on the TELON pilot project, we created the optimal solution — an order processing system that lowers inventory and overhead. Here's how it works: About 9:00 a.m. each workday, our computer connects with our agent at the port of departure. The program extracts the necessary paperwork, books the cargo, and even electronically files the declaration with the Commerce Department. The system also prepares documents in Portuguese, French, and Spanish...and it computes the prices in escudos, francs, and pesetas, if necessary.

"The payback was as timely as the operation we created. The entire system paid for itself in four months...and since that time, it has paid for itself many times over. With the TELON pilot project, I've documented savings of $1,100,000 in personnel, inventory, and operations in one year. Order processing time from our subsidiaries and foreign customers has been reduced from five working days to just one. We've enhanced our ability to support the priorities of other divisions, as well as the company as a whole. The TELON pilot project has energized my department and boosted morale throughout our international network.

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April 29	Madison, Wisconsin
April 30	Milwaukee, Wisconsin
May 1	Minneapolis, Minnesota
May 13	Columbus, Ohio
May 14	San Francisco, California
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1-800/323-7335, in Illinois 312/986-6000

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NEW PRODUCTS/COMMUNICATIONS

Computer Peripheral Systems, Inc. has announced the **T-2** and the **T-4** multiport RS-232-to-two-wire direct interface (TDI) converters/concentrators for the Burroughs Corp. TDI networks.

The T-2 is a two-port unit, said to convert two RS-232 devices to a single TDI line connection. The T-4 is a four-port unit that can convert up to four RS-232 devices to one TDI connection.

The converters provide the RS-232 electrical interface conversion for micros or other terminals that operate with Burroughs poll and select software in micro-to-host in-house links.

The T-2 costs $225, and the T-4 costs $325.

Computer Peripheral Systems, P.O. Box 98282, Atlanta, Ga. 30359.

Software

Harris Corp.'s **Computer Systems Division** has announced that its computers now support **Blocked Asynchronous Transmission** (Blast), the communications software program from Communications Research Group.

Blast enables Harris computers to transmit and receive binary data files, text files and console commands simultaneously. Files can be transferred between Harris systems and any other system that supports Blast. Blast with a modem allows Harris computers to serve as terminals to other systems.

Blast on the Harris computers is priced from $250 to $895.

Harris, 2101 W. Cypress Creek Road, Fort Lauderdale, Fla. 33309.

■

Network Software, Inc. has announced **NIP/System Product**, a new release of its Network Information Package (NIP) for NCR Comten, Inc. users.

The offering collects information necessary to manage and control a communications network. Information is gathered at every NCR Comten node in the network. It is then collected automatically to a central host data base and is available for analysis using report generators.

NIP/System Product is available for all NCR Comten communications processors. The license fee is $250 per month.

Network Software, Suite C110, 7 Mount Lassen Drive, San Rafael, Calif. 94903.

Multiplexers/modems

Codenoll Technology Corp. has introduced its **Codenet-3801** and **Codenet-3810 Fiber Optic Modem Adapter/Extenders.**

The 3801 was designed for IBM System/34, 36 and 38 computers, terminals and printers. It allows up to seven terminals and printers to be placed up to 33,000 ft from the host.

The 3810 was designed for IBM's 8100 Distributed Data Processing (DDP) System terminals and printers. It allows up to 63 terminals and printers to be placed up to 33,000 ft from each of the IBM 8100 DDP lobes.

Both the 3801 and the 3810 typically cost $795.

Codenell Technology, 1086 N. Broadway, Yonkers, N.Y. 10701.

Anderson Jacobson, Inc. has announced the **AJ 4048-2**, a 4.8K bit/sec. full-duplex modem.

The modem is said to transmit data over the public two-wire, dial-up telephone network or private two- or four-wire leased lines with one-call automatic-dial backup. It supports synchronous and asynchronous data transmission.

Other features include integral dialer controlled via modem or terminal, multilevel security and automatic error detection and retransmission in asynchronous operation.

The basic AJ 4048-2 costs $1,995.

Anderson Jacobson, 521 Charcot Ave., San Jose, Calif. 95131.

■

Adacom Corp. has announced the **CM-299 Series**, the **CM-2132 Series** and the **LN-200 Series**, its line of multiplexing products for the IBM 3270 local environment.

The CM-299 Series offers the attachment of up to eight 3270 Type A terminals and printers to IBM 3274 controllers.

The CM-2132 Series offers solutions for 32 ports multiplexed from up to four different controllers.

The LN-200 Series offers support for single 3270 device connections to the 3299 multiplexed cable and direct attachment to 3274s.

The CM-299 costs $990. The CM-2132 costs $2,700. The LN-200 ranges from $350 to $1,500.

Adacom, 8871 Bond St., Overland Park, Kan. 66214.

SYSTEMS & PERIPHERALS

Turnkey systems

Megatronics has announced the **Color Uniformity Recognition Equipment** (CURE) color matching system.

CURE is an interactive computer system said to provide graphic as well as numeric representation of the level of a sample's match or the deviation from a match when compared against master colors or other samples.

It utilizes a color chip video camera and a digitizing board.

The system operator has the ability to choose any size color region within the viewing area and compare it against any other region in the viewing area or against stored results from previous tests.

CURE is priced at about $25,000.

Megatronics, 4095 Chicago Drive, Grandville, Mich. 49418.

Data storage

The Western Peripherals Division of **Wespercorp** has announced the **TDQ-QIC** tape dimension Q-bus QIC-02 coupler.

TDQ-QIC is said to have a single-standard dual-width coupler containing a microprocessor along with interface and control electronics to emulate the Digital Equipment Corp. TS11 and TSV05 tape subsystems.

It contains an 8K-byte data buffer expandable to 32K bytes. In addition, TDQ-QIC features a drive address system in which each coupler and drive subsystem has its own address.

Each coupler can support one drive. The price is $1,250.

Wespercorp, 1821 E. Dyer Road, Santa Ana, Calif. 92705.

■

Flexstar Corp. has announced the **FS6000 Series Analog/Digital SCSI Disk Drive Test System**, said to be capable of analysis of the head-to-disk interface of Winchester disk drive small computer systems interface (SCSI).

The FS6000 Series reportedly uses test points embedded within the drive to provide a full range of analog/digital tests including timing, head disk assembly, read channel and phase-locked loop tests. The units are self-calibrating during operation.

Four configurations are available: the FS6001 personal computer compatible, including SCSI test board and analog controller board plus vertical/horizontal margining probe; the FS6002 PC compatible, including SCSI test board only; the FS6011, including the SCSI board, analog controller board and margining probe; and the FS6022, with SCSI test board only.

Prices are $11,995, $9,995, $8,995 and $6,995, respectively.

Flexstar, Suite 204, 780 Trimble Road, San Jose, Calif. 95131.

Terminals

Barcode Industries, Inc. has enhanced the **MR-2** terminal for its MR-Net network that links up to 16 bar code readers in a daisy chain to a single computer port.

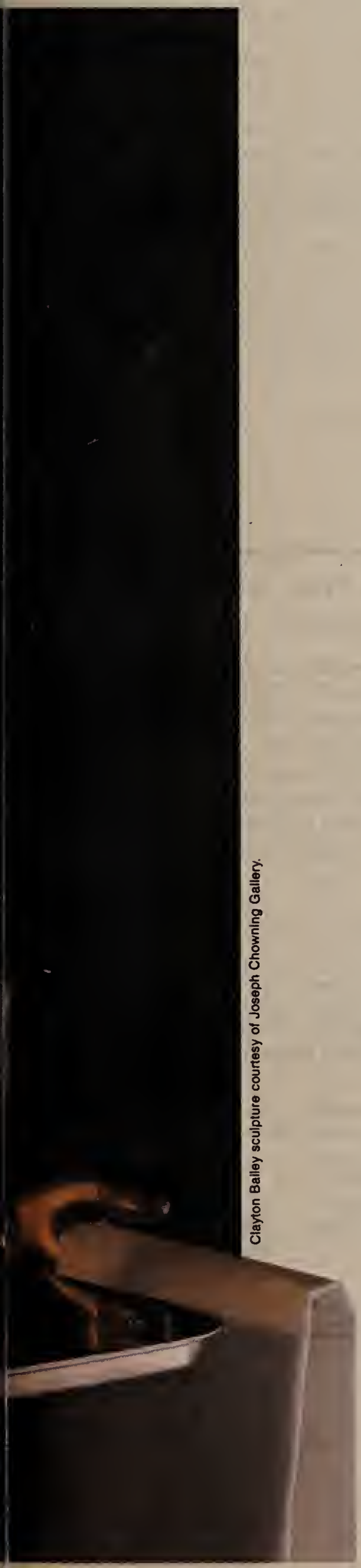
MR-2 is now available with a two-line display that can be used to monitor bar code data sent to the host.

The host can also reportedly send messages to the display.

In addition, handheld or fixed-mount laser scanners can now be connected to daisy-chained units on the MR-Net, according to Barcode Industries.

The MR-2 with a display costs $945.

Barcode Industries, 17 Barstow Road, Great Neck, N.Y. 11021.



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For further information, please call 800-446-4321. Or you can write directly, PacTel Spectrum Services, 100 Pringle Avenue, Suite 750, Walnut Creek, CA 94596, attention N. Floyd, Marketing Director.

Clayton Bailey sculpture courtesy of Joseph Chowning Gallery.

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COMPUTER INDUSTRY

Section begins on page 110

Software vendor seeks perfect fit in products, philosophy

DDA sells no financial program before its time

By Maura McEnaney

SUNNYVALE, Calif. — Mainframe software vendors do not often walk away from a $100,000 sale to a major insurance company. But Data Design Associates, Inc. (DDA) has done it more than once. "We have walked away from business when we felt the company's software requirement and our system wasn't a good match," claims DDA President Dave Lowry.

Twelve-year-old DDA has carved out a spot in the financial applications market among giant software vendors like Management Science America, Inc. (MSA) and McCormack & Dodge Corp. (M&D) by providing the "good matches" that Lowry describes. Last year DDA made $1.2 million in profit on $10.5 million in sales and expects sales of $15 million for the current fiscal year ending today.

But DDA's strategy has also lost the company a few friends. "Some people feel kind of insulted when you tell them they don't have the type of support group needed to make our products successful," Lowry says.

DDA was founded in 1973 by Lowry, a former technical manager at MSA and program developer at Western Electric Co. The company is entirely owned by its 100 employees, all of whom participate in policy decisions and hiring selections. The company perhaps epitomizes impressions of the California high-tech lifestyle — health club memberships, mountaineering outings and beer blasts are all part of the benefits package. "One of our primary goals is to have fun," one worker says.

But the workers take their company seriously. When potential employees are being interviewed, any interested employee can sit in on the interview and pose questions to the candidate. Managers then survey employees for their decisions. There have been occasions when coworkers vetoed a manager's choice of a hire.

George Proudfoot, Data Design Associates vice-president

"I was here interviewing for three days," says Jody Bennett, an account manager for DDA's Accounts Payable system and the company's 43rd employee. "At times there were as many as 20 people sitting in on the interview," she recalls.

Annual retreats to mountain resorts are often the setting of some key decisions and management training sessions. At this year's retreat, workers tested their creativity when groups were given a box of miscellaneous items and told to invent a machine that could push a ping-pong ball off a table and into a paper cup.

At the same retreat, workers voted to restrain growth to no more than $18 million in revenue next year. "A lot of employees felt the company was growing too fast," says Vice-President George Proudfoot.

Nonetheless, DDA hopes to be a $50 million company in five years. Dataquest, Inc. software analyst Paul Cubbage, however, says DDA will hit a maximum of $30 million in sales.

DDA's products include General Ledger, Accounts Payable/Purchase Control, Fixed Assets and Capital Project application packages as well as three systems software packages.

DDA's niche includes a 6% share of the accounts payable marketplace, compared with the 65% combined share of MSA and M&D.

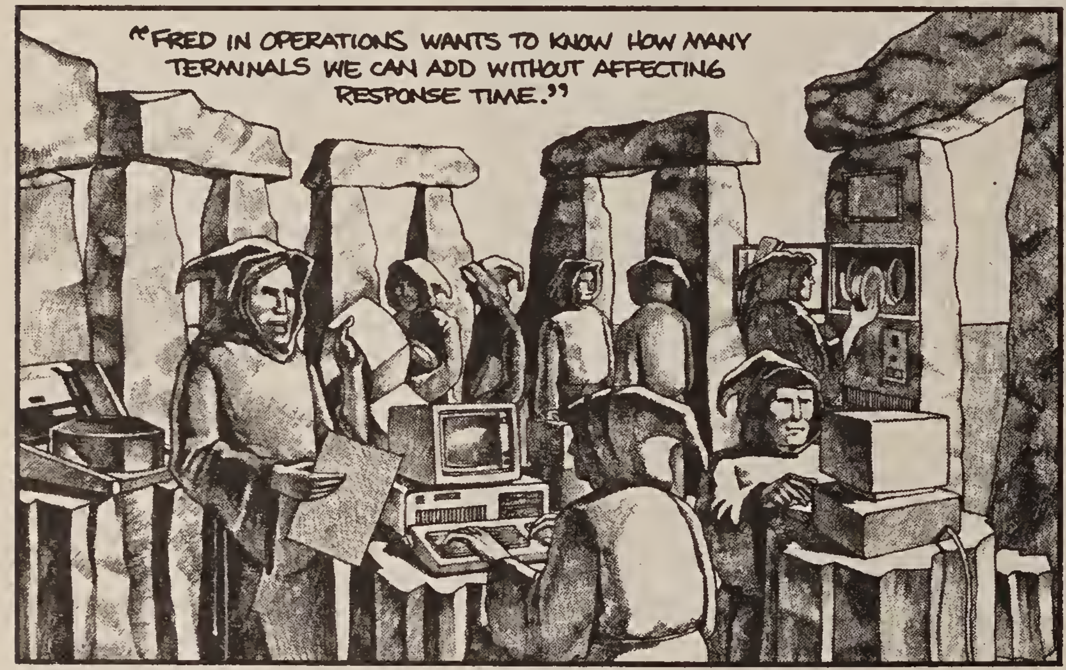
According to Cubbage, DDA's product design philosophy will limit how fast it can grow. Beta test sites are never used for product testing, for example, often delaying product delivery dates.

Lowry "has always had a policy that we don't do beta testing," says Mike Kaiser, product research director. "If products at beta sites need changes, then you haven't thought through the system. We want our development people to know they are not going to have another shot at the program."

Such philosophies can create product cycles that would be intolerable elsewhere in the industry, but DDA sticks to its guns. "Waiting four years to release a product is not unusual at DDA," according to Proudfoot. "Our philosophy is to do small amounts of business but really do them well. We believe in expanding our product line but doing it slowly. When you bring out a product, it's a tremendous drain on the company, and if you rush it, the quality and control go out the door."

DDA admits that its sales suffered while it waited to bring out a general ledger package. "When we started

See **DDA** page 85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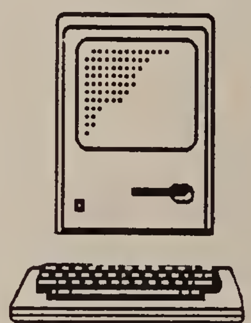

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The State of California's Department of Health Services is actively seeking firms interested in competing for the new fiscal intermediary contract. The contractor will operate the technologically advanced California Medi-Cal Management Information System to adjudicate Medi-Cal claims and produce program reports. The current system adjudicated an average of 9 million claim lines per month during 1985 for services to some 3 million Medi-Cal eligibles at an annual program cost of over $4 billion.

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California Department of Health Services
Fiscal Intermediary Management Division
714 "P" Street, Room 950,
Sacramento, CA 95814
(916) 324-1060

Tide fails to lift industry's boat

From page 110

ing- soft industry conditions. Wall Street has responded by lowering Big Blue earnings estimates to the $12-per-share range, up from last year's $10.67 per share, while projecting a revenue increase of about 10% to $55 billion — significantly below IBM's stated corporate goal of 15% annual growth.

Firms such as Burroughs Corp., Concurrent Computer Corp. and Convergent Technologies, Inc. (now known as Convergent) are also cautioning the investment community to expect somewhat lower results through the third calendar quarter.

The downbeat mood, for the most part, has caused investors to shy away from computer industry issues. Moreover, bad memories still linger from 1983, when highly touted and richly valued new computer industry issues such as Miniscribe Corp. and Priam Corp. flooded the market. Many of those are currently trading at half their initial offering price.

Computer Industry section begins on page 110.

"The computer industry has not been able to recapture the imagination of investors nor recapture the growth of the past," notes Steve Ossad, an analyst who tracks the computer industry for L. F. Rothschild, Unterberg Towbin in New York. "Whereas people accepted as true that technology stocks would forever be growth oriented with a high degree of insulation from overall economic pressures and factors, the opposite has proven to be true," he adds.

In addition to slim corporate profits, another factor affecting trading of computer industry shares is the gloomy short-term outlook for capital equipment spending.

According to projections recently released by the New York investment banking firm Smith Barney, Harris Upham & Co., capital spending is expected to decline by 11.3% in the first quarter of this year compared with the fourth quarter of last year. In the second quarter, capital spending is expected to increase 4.9% compared with the first quarter. For calendar 1986, capital spending is expected to increase by 2.6% compared with 1985.

"That compares with capital spending increases of 22% in 1984 over 1983 and 8.6% in 1985 over 1984," notes Tim Summers, a Smith Barney analyst. "We expect it to pick up to 7.8% in 1987 over 1986 and 10.9% in 1988 from 1987."

Unlike some analysts, Summers is not painting computer industry issues in broad strokes. "I look at it on a company-by-company basis," he says. "IBM is not saying very good things, and its stock has suffered. On the other hand, Digital Equipment Corp.'s stock has doubled in the last 12 months."

Bob Grandhi, who follows the software and services industry for E. F. Hutton & Co., agrees with Summers' analysis. "In the software business in particular, you can't put all the companies under one umbrella," Grandhi says. "Software AG of North America, Inc. is doing well and so is its stock. Cullinet Software, Inc. is not and neither is its stock."

In the services sector, Grandhi says that most of the firms he tracks, such as Automated Data Processing, Inc. and Computer Sciences Corp., are outperforming most computer industry firms. "This is because demand does not fluctuate since they do business on a long-term contract basis," he explains.

The recently completed initial public offerings of Microsoft Corp. and Oracle Corp. are indications that, despite the overall negative perception of the computer industry, there continues to be interest in young companies that have proper seasoning.

A hidden bright spot in the bearish computer outlook, L. F. Rothschild's Ossad says, is that everyone remains so negative on the computer industry. "It's a hair-trigger situation," he says. "A lot of first- and second-tier technology stocks have not participated in the rally. People who have made money in other segments of the market might be ready to rotate their money into computer industry shares. I'm not sure about when or where, but it could happen."

DDA looking for perfect fit

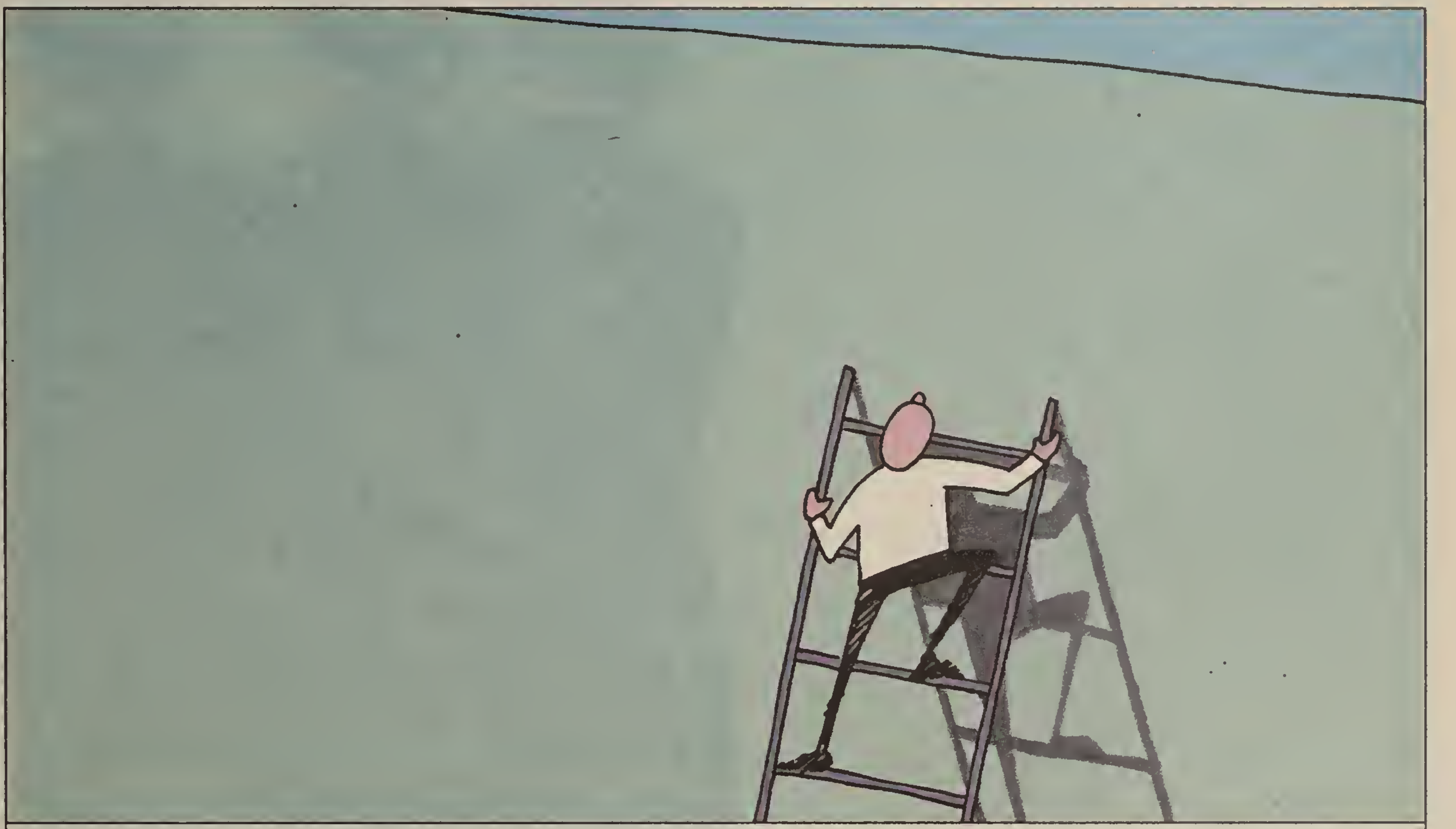
From page 84

developing a general ledger package, it was a very hot market," Proudfoot recalls. "In the year or so that we took to put it out, the general ledger market was saturated. Had we not waited, we could have caught that wave."

DDA users welcome the company's approach to product development. "They have very clean releases," says Arthur Hussey, manager of financial and bank support systems at Lloyds Bank California.

Lloyds runs DDA's Accounts Payable and Fixed Assets Accounting package. Keith Weber, project manager for financial systems maintenance, says, "We haven't been down one day because of a production problem caused by the system."

The future looks promising for DDA, according to Cubbage: "They have a solid product, happy customers and money coming in. That looks like a pleasant world, indeed."



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Datapoint forecasts calm after 1985 takeover, spin-off storm

CEO predicts 'return to profitability' in 1986

By James A. Martin

SAN ANTONIO — There would be little argument with the opening words of Datapoint Corp.'s most recent annual report: "Fiscal 1985 was a year of dramatic change for Datapoint as well as the computer industry as a whole."

For this troubled minicomputer corporation, those changes include the following:

- A company takeover by Asher B. Edelman, a New York financier who is known for liquidating firms for their assets.
- The spin-off of Datapoint's service and support division as a separate company, Intelogic Trace, Inc.
- Fiscal year net losses of $48.3 million.
- A spate of lawsuits alleging violations of securities laws.
- The introduction of three new products to an industry already suffering, by most accounts, from product overload.

Despite Edelman's reputation for liquidating companies for their assets, there appears to be no such plan for Datapoint at this time, according to President and Chief Executive Officer Edward P. Gistaro.

Datapoint's Edward P. Gistaro

"Edelman has been chairman of the board now for one year, and he hasn't liquidated anything yet," Gistaro says. "He spun off Intelogic Trace because he felt there was a real chance available in the stock market for a service company, and he's certainly been proven correct."

Approximately one year after Edelman began his takeover of Datapoint, Intelogic Trace is trading at about $20 per share. "Combined with the price of Datapoint, that's about $25 per share," Gistaro says. "When we spun off Intelogic Trace, the total company was trading for less than $12 per share. So that action alone has doubled the value to investors, without liquidation or anything else."

Intelogic Trace recently reported second-quarter 1986 earnings of $5 million, compared with pro forma earnings of $4.5 million for the year earlier.

Edelman and Datapoint board member Charles P. Stevenson head an investor group that initiated a $6 per share leveraged buy-out offer of Datapoint in September 1985. The group is in the process of arranging financing plans, which are expected to be completed by the end of the current quarter, April 30.

Gistaro says he believes the group has a "70% chance" of acquiring the financing and shareholder votes needed to take Datapoint private. Even if the financing is not complete by April 30, efforts will be continued to wrap up the deal beyond that point. But despite the outcome, Datapoint's strategy will not be greatly altered either way, he adds.

Although 1985 was a white-knuckle year for Datapoint, 1986 is expected to be relatively stable and profitable, at least in comparison. "I am looking for the balance of fiscal 1986, which ends in early August, to be a period of continuing improvement in product orders and a return to profitability," Gistaro says.

Gistaro bases his remarks on the industry's outlook for an improved economy for 1986, the company's recent marketing strategy of focusing on its installed base of customers and its hopes for a corporate image rebound following Edelman's takeover.

But the company's business challenges remain obvious — and formidable. Although Datapoint is generally considered a good engineering, technology and product-oriented company, many potential large users are skeptical about the company's stability and, therefore, shy away from its products, according to William C. Rosser, vice-president in charge of small computer systems at the Gartner Group, Inc. in Stamford, Conn.

"Datapoint has had quite a history of problems that have gotten progressively worse," Rosser says. "A significant amount of employees have left because they can find opportunities in other companies without all the troubles, and that's hurt Datapoint. Even though the company is known for fairly good products, they continue to show shortcomings in getting those products positioned in the market."

Gistaro is optimistic that Datapoint's product strategies will strengthen ties to its current customers and, eventually, create new ones. To accomplish this, the company is building a family of products using its Attached Resource Computer local-area network and Resource Management System proprietary operating system as a foundation.

For the shorter term, Datapoint is positioning the Starfleet processor line as its flagship product. The first of this series, the 16-bit Starship 1, was introduced in September 1985. Starship II, due out in mid-year, will include interfaces to Microsoft Corp.'s MS-DOS and Unix.

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Industry supports Senate bill

Tax reform proposal would spark R&D

By Mitch Betts

WASHINGTON, D.C. — The U.S. Senate Finance Committee's draft bill for federal tax reform would treat the computer industry even better than did the bill passed by the U.S. House of Representatives last year.

Although the thrust of tax reform legislation is to repeal most business tax breaks, the proposal drafted by Chairman Robert Packwood (R-Ore.) would make permanent the 25% research and development tax credit, just as the computer industry had sought [CW, Dec. 30, 1985/Jan. 6, 1986].

Packwood's proposal also would eliminate the 10% investment tax credit, cut the top corporate tax rate to 35% and put computer equipment in a three-year depreciation category.

In an effort to make his plan appealing to members of the committee, Packwood inserted numerous special tax breaks favored by committee members, such as the R&D credit extension favored by Sens. Lloyd Bentsen (D-Texas) and John C. Danforth (R-Mo.).

The House bill trimmed the R&D credit to 20% and extended it for three years. The credit expired at the end of 1985.

The Computer and Business Equipment Manufacturers Association (CBEMA) has a "very positive view" of the Packwood proposal, according to spokeswoman Charlotte LeGates.

The Coalition for the Advancement of Industrial Technology also praised the Packwood proposal for its treatment of the R&D credit. Coalition leaders include representatives from IBM, Hewlett-Packard Co. and CBEMA.

The proposal, which the Senate committee will use as the starting point for writing its tax reform legislation, gives the computer industry more favorable income tax rates and depreciation schedules than did the House bill.

Packwood's proposal cuts the maximum corporate tax rate from 46% to 35%, a move supported by high-technology firms in high tax brackets. The House bill cut the top rate to 36%.

"Keeping rates low is even more crucial because of the proposed end of the investment tax credit, which has been a major economic boost both to our industry and to our customers," according to Ted A. Heydinger, a CBEMA vice-president.

The Packwood proposal places computers and advanced telecommunications equipment in the three-year depreciation category, rather than the five-year category set by the House bill.

Chilly effect of insurance crisis

From page 110

too passive in their responsibilities to stockholders."

The directors' liability chill has given birth to the latest wrinkle in investment banking services: the fairness opinion. The theory is simple — the boards on both sides of a potential deal seek an impartial expert opinion on the transaction, creating a prevention of, or at least defense against, future litigation.

But, alas, investment bankers do not come cheap. Fairness opinions generally command six-figure fees — maybe peanuts in the context of eight- or nine-figure mergers, but nonetheless a new expense that didn't use to exist at all.

Directors can be sued for a wide variety of actions, but a merger or acquisition, with its major impact on cash resources, corporate direction and organizational structure, can be an easy target if things go sour for the shareholders.

"Acquisitions are so visible," says Robert J. Conrads, the new vice-president of mergers and acquisitions at Kidder, Peabody & Co. "There have been a lot of bad ones in this industry in recent years, and the market remembers that."

Both Goldstein and Conrads, however, remain reasonably optimistic about the mergers and aquisitions climate for computer companies.

Conrads points out that there is potential director's liability for *not* following through on a deal if all indicators are right — a cash-rich acquisitor eyeing a solid, technology-rich firm that fits perfectly with the acquisitor's product line, for example. And he notes that many potential buyers have high stock valuations right now, a leading indicator that they may be shopping.

The net effect of the directors' liability dilemma may well be that the quantity of mergers and aquisitions goes down while the quality goes up. Boards on both sides will be much more careful, and a company sitting on a pile of cash won't be scouting every software start-up it can get its hands on. Indeed, many high-tech firms in that position have done just the opposite, using the cash to buy back their own stock.

The lessons of formerly acquisition-minded firms like Control Data Corp., Informatics General Corp. and Management Science America, Inc. stand out now more than ever, Conrads says. You won't be seeing companies ranging far out of their core markets to buy up subsidiaries with a questionable relevance to their main purpose. The risks are higher and more expensive than ever.

But that doesn't mean the pace of sensible, logical partnerships will slacken. In fact, Broadview's Goldstein notes with irony that there is a quick way for a jittery board to relinquish control of its company, thereby removing itself from liability. "That way," he quips, "is to have their company be acquired."

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Kapor steps down as manager of Lotus division

CAMBRIDGE, Mass. — Lotus Development Corp. announced last week that its founder, Mitchell D. Kapor, will step down as general manager of the company's Business Products Division (BPD). He will be replaced by Daniel A. McMillan in a transition effective April 2.

The action took observers by surprise and indicated that Kapor is reducing his involvement in the company's day-to-day business activities. Kapor had taken the helm of the Business Products Division in October 1985, in a move that the company said indicated Kapor's intention to become more involved in Lotus' daily business.

"When I assumed day-to-day operating responsibilities at the BPD, the assignment was to take as long as necessary to launch a series of new development and operating initiatives," said Kapor, who will remain the company's chairman. "Now that those initiatives are well under way, it's time to turn responsibility over to a permanent management team."

McMillan, 53, is currently the publisher of *Lotus Magazine*, which Lotus publishes for users of its 1-2-3 and Symphony software. That post will be filled by Lotus Sales and Marketing Director James R. Pierce, former publisher of *Business Week* magazine. Lotus has yet to name a successor to the sales and marketing post.

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INDUSTRY NOTES

Triology's Elxsi pares staff by 30

Trilogy Ltd. recently reported more bad news as its **Elxsi** supermini subsidiary laid off 30 of its 260 employees. The cuts fell mainly in manufacturing and did not affect product development or customer support. "We are able to fill current demand from existing inventory," said Peter Appleton-Jones, president and chief executive officer of Cupertino, Calif.-based Elxsi.

■

Citicorp has made an offer to acquire **Quotron Systems, Inc.** in a cash merger for $19 per share, or about $680 million. Quotron, based in Los Angeles, provides stock quotations and data base services.

■

Micropro International Corp. reported second-quarter revenue of $10.5 million and profits of $863,000, or 7 cents per share, compared with year-earlier revenue of $9.9 million and a loss of $669,000, or 5 cents per share.

■

Digital Equipment Corp. recently announced a two-for-one stock split. The shares will be distributed as a 100% stock dividend. The last time DEC split its stock was in 1976.

■

Fujitsu America, Inc. said its subsidiary, Fujitsu Imaging Systems of North America, had reached an agreement to acquire the North American operations of Burroughs Corp.'s Danbury, Conn.-based **Imaging Systems Division** for approximately $20 million.

■

Micron Technology, Inc., the Boise, Idaho-based semiconductor firm, said second-quarter revenue dropped to $9.4 million from the year-earlier level of $18.2 million. A loss of $9.8 million, or 51 cents per share, was reported for the quarter, compared with a profit of $2.8 million, or 15 cents per share, in the same-quarter a year ago.

■

Gould, Inc. said it acquired **PSC, Inc.**, a Fairfax, Va.-based computer and electronics systems engineering firm. The terms of the acquisition were not disclosed.

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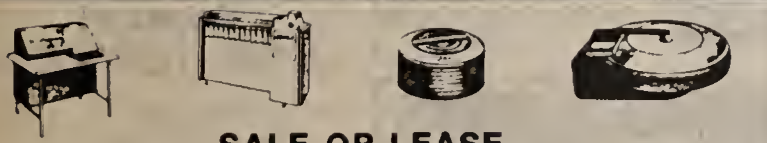

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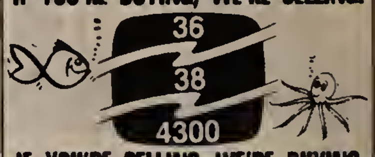

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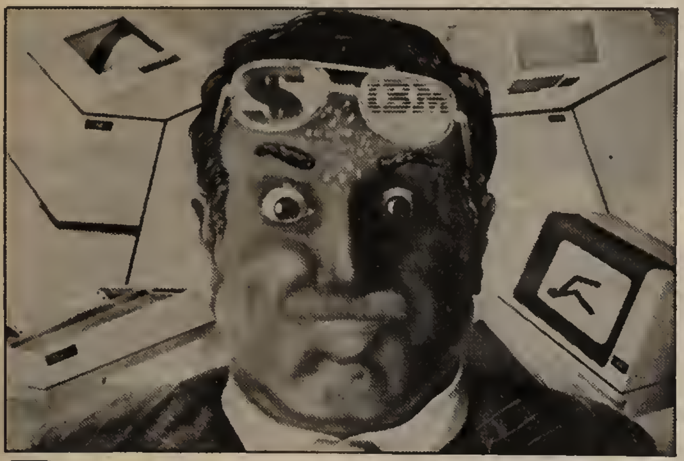

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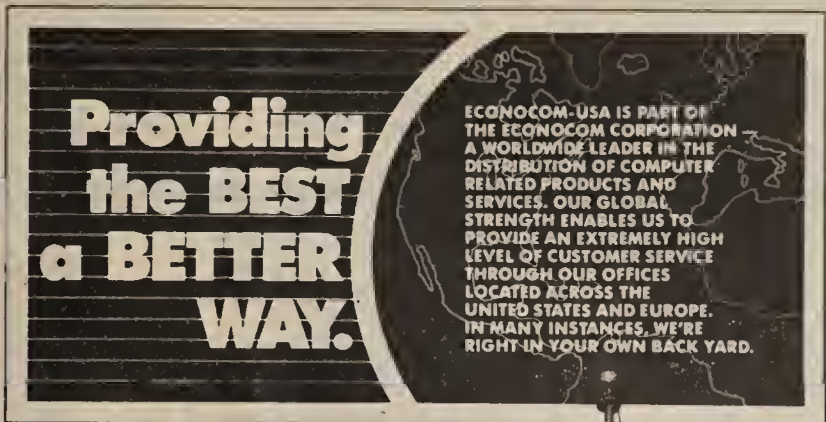

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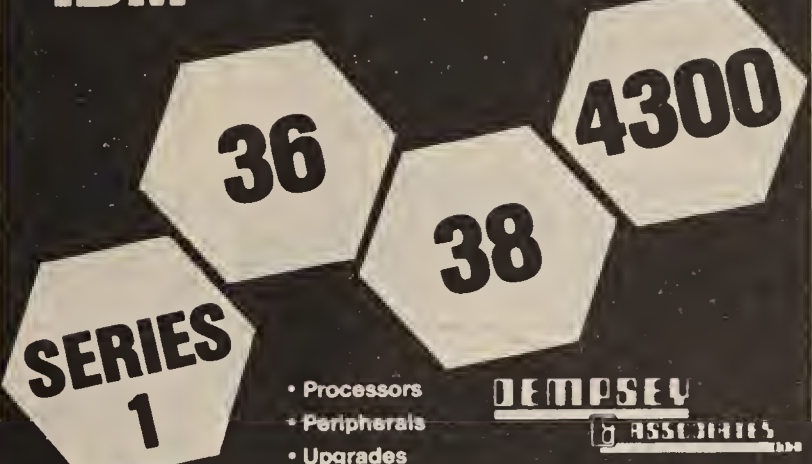

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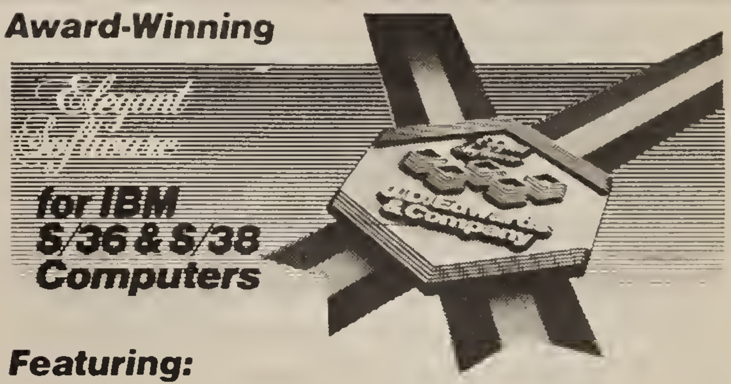

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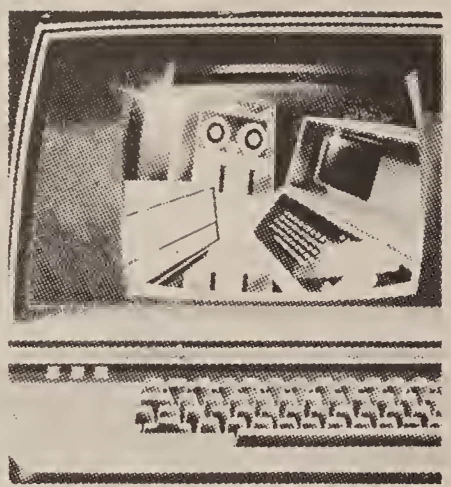

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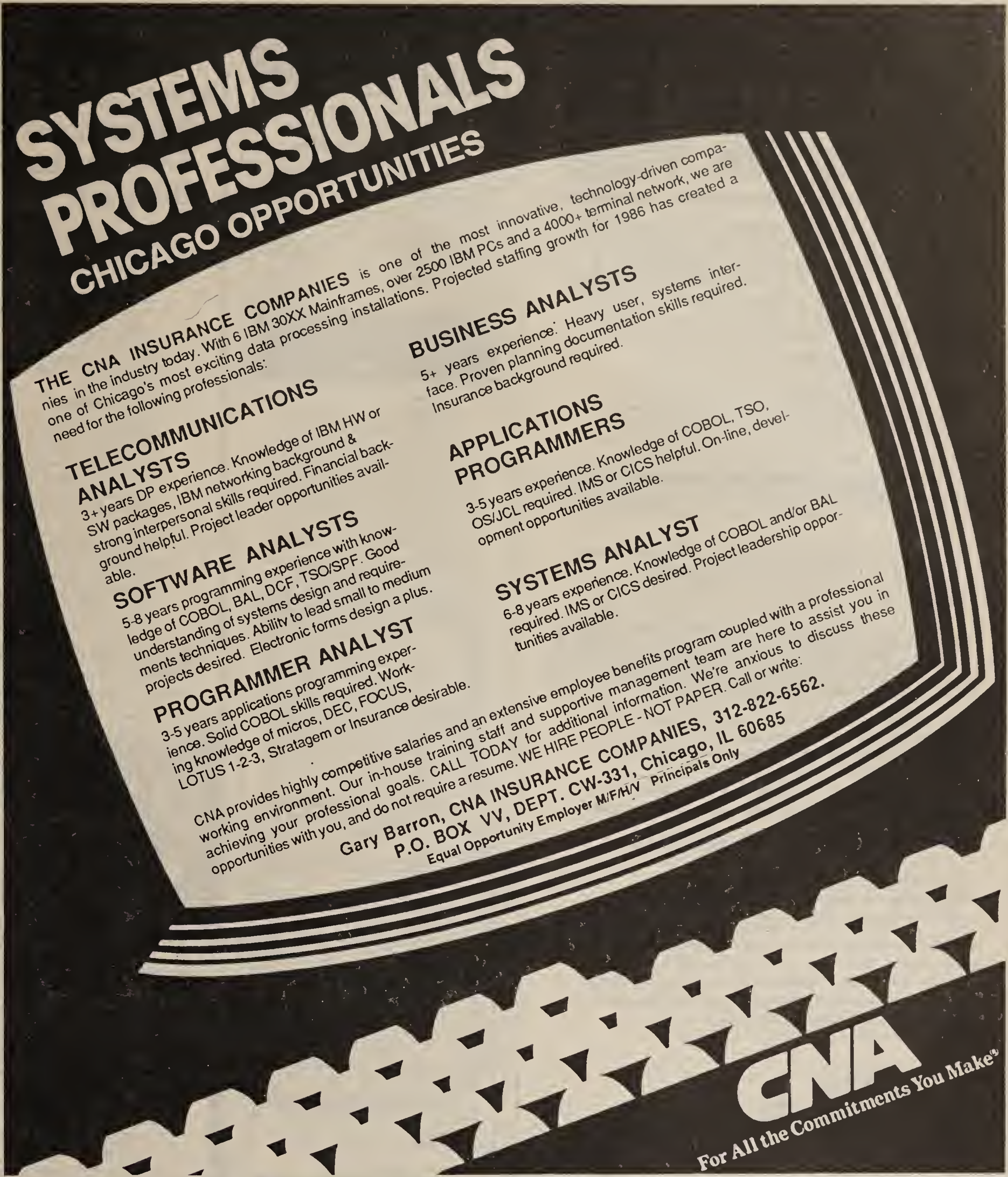

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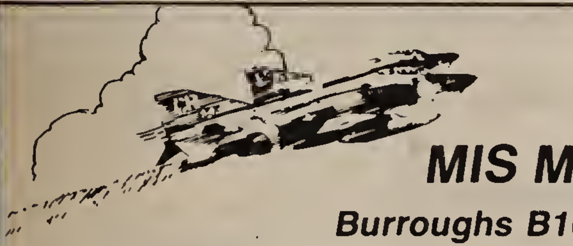

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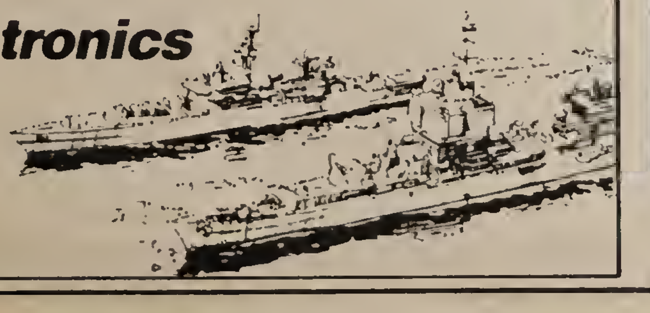

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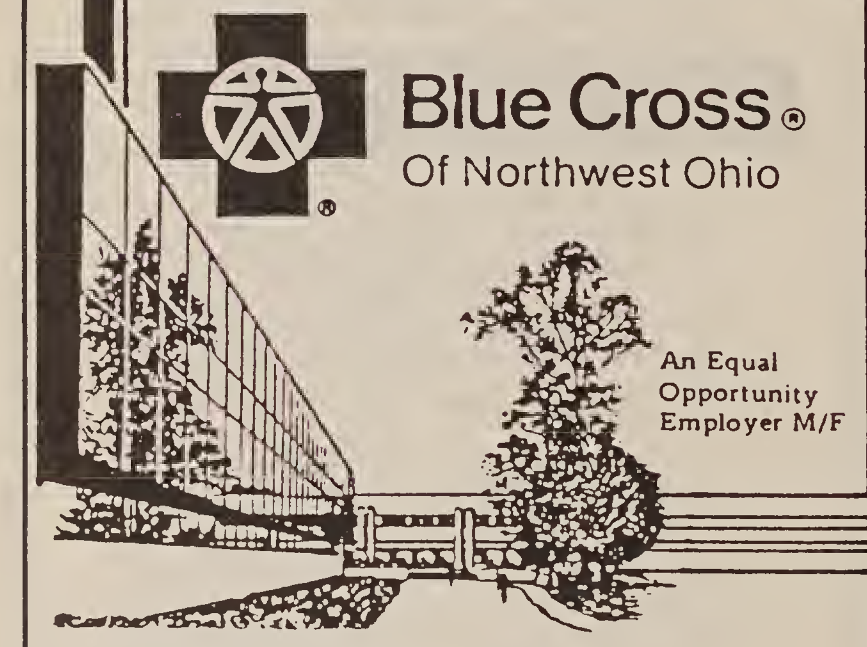
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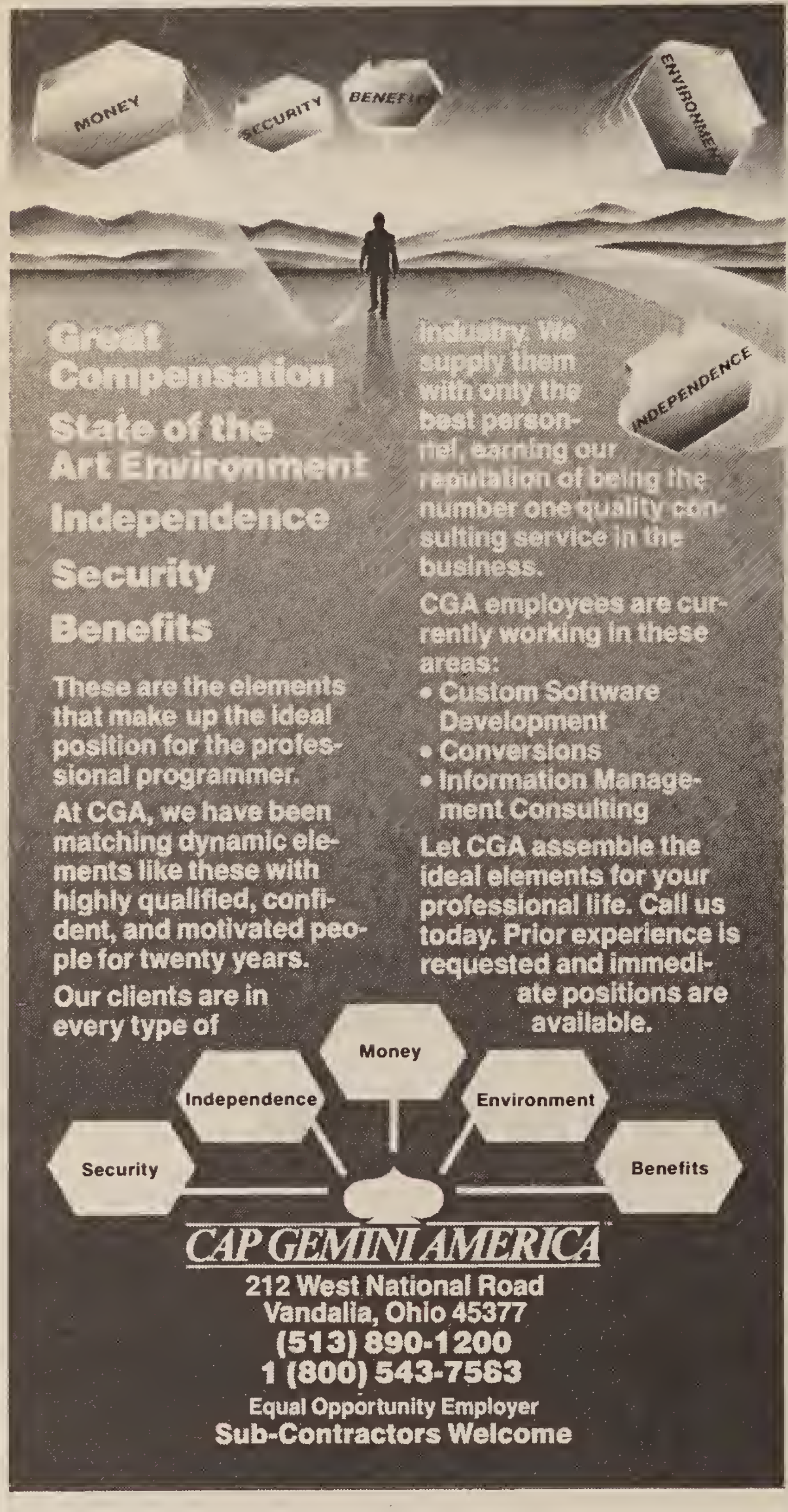

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IBM files trademark suit

By Clinton Wilder

IRVINE, Calif. — IBM has filed a trademark infringement suit against a computer equipment broker for using the toll-free phone number, 1-800-IBM-USED, in its advertising.

The suit, filed Feb. 26 in U.S. District Court in Los Angeles, asks the court to order Marshall Lewis & Associates, Inc. to stop using the three-letter abbreviation and seeks unspecified damages.

Marshall Lewis, an 8-year-old broker selling and leasing mainly IBM mid-range systems, uses the number prominently in advertisements in *Computerworld* and other trade publications.

IBM alleged that the use of its name is "misleading and deceptive" and implies that the defendant is affiliated with IBM.

"That's ludicrous," said Marshall Lewis President Al Binder. "We have done about 3,000 transactions, and there is no way that any of our customers thought we were IBM."

Before the lawsuit was filed, IBM asked Marshall Lewis in writing to halt its use of the name, and the company refused to do so, according to Binder.

Akers' rise makes smooth transition

From page 110

the president's reins from Cary in January 1981 and moved up to chairman in February 1983. He was instrumental in forging IBM's low-cost, high-volume production strategy that enabled the mainframe giant to compete in and eventually dominate the microcomputer business. The keys to his strategy were automating IBM manufacturing facilities and relying on outside suppliers to produce components at costs well below IBM's own.

Upon Opel's retirement two months from now, Akers will become the first man to hold simultaneously the positions of president, chief executive officer and chairman since Cary did so in 1973. Analysts foresee a 10-year era for the 51-year-old chairman to make his mark during a challenging time in IBM's history.

"Because of his age, Akers is in the position to put a personal imprint on the future direction of the company — to be another Cary type," Annex Research's Djurdjevic explained. "Opel has been pretty much a caretaker chairman, carrying on the direction set out by Cary. Akers' challenge is to hold down Cary's and Opel's aggressive expansion philosophy until demand catches up with production capacity."

Most analysts said they do not expect Akers to relinquish the presidency for at least a year while he consolidates his power. But speculation was rife last week as to whom he would eventually name as president.

Allen J. Krowe, senior vice-president and chief financial officer, and Jack D. Kuehler, senior vice-president in charge of worldwide manufacturing, have been mentioned as likely successors, but both are two years older than Akers and might be passed over, analysts said.

"I would look for someone who is lesser known and younger than Akers to be named president," noted William Easterbrook of Kidder, Peabody & Co. "Akers is young and will be there for eight or nine more years at least. That's a long time for anyone to wait."

Djurdjevic mentioned a possible younger dark horse in Vice-President and Group Executive George H. Conrades, a board member of IBM World Trade Americas/Far East Corp. "Traditionally, IBM has filled that role with marketing rather than financial types, which goes against Krowe," he said. "How long Akers waits will be a function of how fast a new star emerges."

IBM also said it expects to cease manufacturing its Personal Computer ATs and XTs at its Austin, Texas, plant by 1987. Production of those offerings will shift to Entry Systems Division plants in Boca Raton, Fla.

3Com merger: Cold feet at the 'alter'

ANALYSIS

SAN JOSE, Calif. — The proposed merger between Convergent Technologies, Inc. and 3Com Corp. was blessed by analysts at the outset, but the feeling in the wake of last week's cancellation was that it was not exactly a match made in heaven.

There were rumors of cheers at the 3Com offices when news of the failed merger broke and even speculation that 3Com shareholders planned to reject the merger proposal had it come to a vote.

The failed merger left behind some disappointed executives who worked closely together for months to finalize merger details. Some 3Com employees were already working out of the Convergent offices, and the "new Convergent" was planning to announce several OEM agreements, sources said.

Although executives at both companies hinted at the possibility of renegotiating the merger agreement, it is unlikely that will happen. "This has got to be fraught with all sorts of emotional baggage," said Dataquest, Inc.'s Gwen Peterson. "It may be more painful for them to renegotiate."

"Convergent was not the best match for 3Com; they could have done better," said Lissa Morgenthaler, editor of the "California Technology Stock Letter." "3Com is in a low-end business and looking for a big, strong company to align themselves with. They were running for cover faster than they needed to."

— **Maura McEnaney**

Positive market conditions make for a Wyse investment

ACTIVE ISSUES
Kathy Porteus

Can the news at Wyse Technology, Inc. get any better?

In recent weeks, Wyse (WYSE — 14⅜) climbed to new highs, reflecting positive market conditions and renewed investor confidence in the ASCII terminal company. That confidence was temporarily shaken in January when Altos Computer Systems announced it would sell its 30% stake in Wyse. Wyse's stock, at current levels, reflects belief that Altos will remain a major OEM customer.

Nevertheless, Wyse continues to trade below market value, or the average price/earnings multiple at which investors currently trade stocks. "If you believe Wyse will earn $1.60 a share in its fiscal 1987 ending March 31, 1987," says Gibbs Moody, a securities analyst with Gartner Securities, "then you have to believe the stock is currently undervalued."

For Wyse's current fiscal year ending today, most analysts estimate the company will earn about $1.20 a share on revenues of $130 million, a 67% increase over fiscal 1985 sales.

According to Walter J. Winnitzki, assistant vice-president with L. F. Rothschild, Unterberg Towbin, Wyse is expanding into new video display markets by leveraging its expertise in display technology, high-volume and low-cost manufacturing, research and development and management. "The future of Wyse," Winnitzki says, "is clearly outstanding and the company ranks as perhaps the strongest terminal vendor right now."

Fueling optimism for Wyse's prospects in calendar year 1986 are promising new products and expanding distribution opportunities among Fortune 1,000 companies and foreign markets.

One of Wyse's most exciting new products, according to Moody, is the WY-700 graphics monitor, a high-margin product providing 1,280- by 800-pixel resolution, bundled with a graphics board. A few weeks ago, Wyse began quantity shipments of the high-end graphics monitor to its distributors. Moody says he would not be surprised if Wyse eventually decides to distribute its WY-700 under the label of Amdek Corp., a Chicago-based monitor maker that Wyse acquired last month.

Analysts say Wyse's 1987 fiscal year should benefit from a new agreement with Businessland, Inc., which will distribute Wyse products to Fortune 1,000 companies. "Wyse is also making a major push in its overseas business," says Kenneth Leung, vice-president with Smith Barney, Harris Upham & Co., "and the U.S. dollar is helping these efforts."

What about prospects for Wyse's bread-and-butter terminal business? According to Winnitzki of L. F. Rothschild, many investors fail to realize that the terminal industry is still growing. In particular, Wyse benefits from healthy demand for multiuser systems, from which ASCII terminals hang.

Some analysts admit being uncomfortable with Wyse's growing participation in the personal computer market, which now accounts for about 20% of company sales. Other analysts regard Wyse's personal computer strategy as a natural extension of its terminal business, enabling third-party integrators to configure systems offering both remote and local processing capabilities.

Yet in comparing Wyse with its competitors, most analysts agree that Wyse stands in a league by itself. "There are, of course, no guarantees in the investment business," Gartner's Moody observes, "but the risk in investing in Wyse does not seem great at this time."

Porteus is president of Strand Research Associates, a Centerville, Mass.-based company that provides customized research services for financial and high-tech firms.

Convergent, 3Com merger collapses

From page 110

with four other top executives in November to found the Dana Group, a supermicrocomputer company in San Jose. "We were going to have a little celebration here. I thought that Paul Ely had an inspired idea. I thought both the people and the products were very complementary."

The possibility of a future 3Com-Convergent merger has not been ruled out. "This is a cooling down period," Krause said.

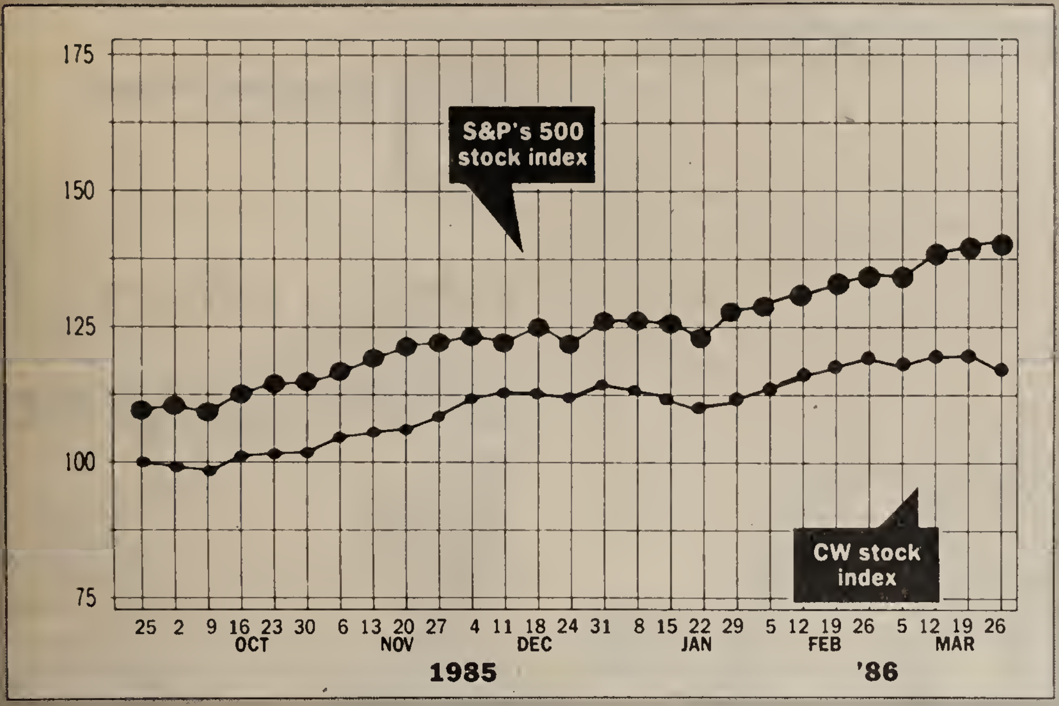
In the meantime, 3Com and Convergent are expected to pursue joint marketing agreements for electronic mail and office graphics software as well as future OEM agreements. 3Com is developing a network file server that could be integrated into Convergent systems, according to Dataquest, Inc. analyst Gwen Peterson.

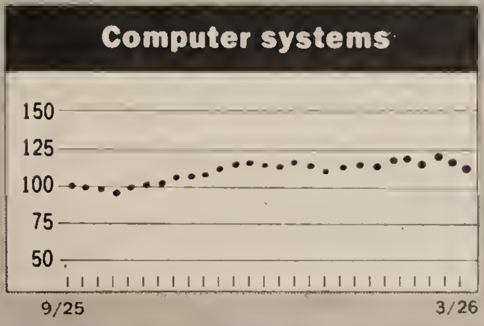
"Over the past several months, we have been developing a number of products of interest to Convergent's OEM customers, and they have been working on several products of interest to us," Krause said. 3Com provides Ethernet networking products for Convergent's Ngen workstations.

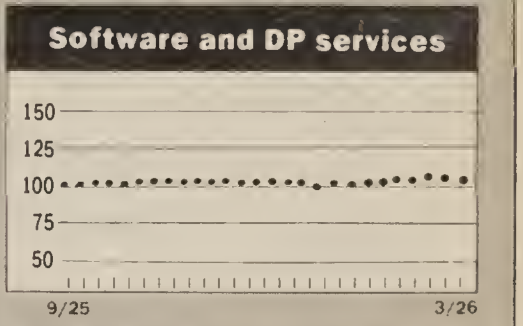
The merger halt will have little effect on Baron Data Systems, a San Leandro, Calif., systems integrator in which Convergent holds a 40% interest, said Baron Chairman Charles Davis. "Naturally I'm disappointed, but I don't think it's the end of the world by any means," Davis said.

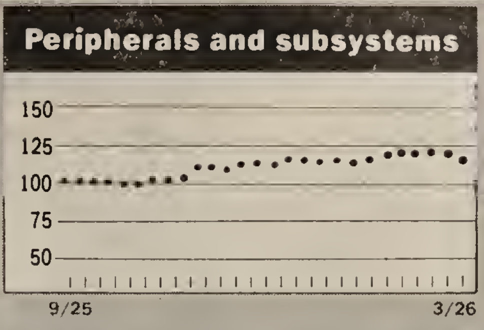
MITCHELL J. HAYES

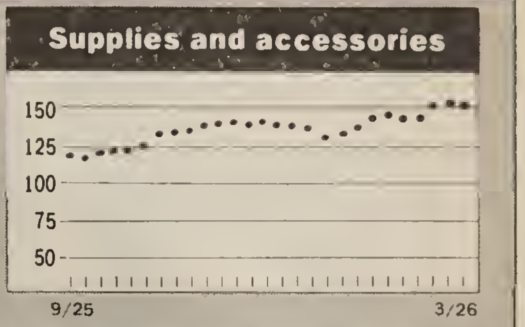
Computerworld stock trading index




Computer systems

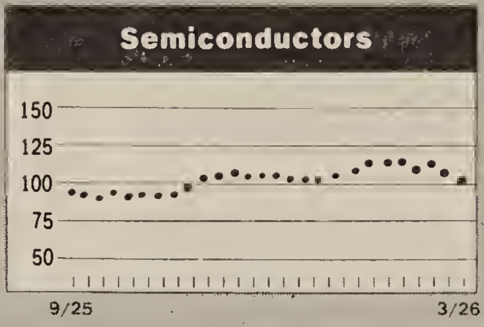

Software and DP services

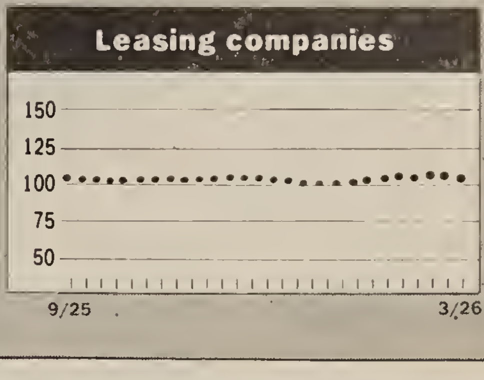

Peripherals and subsystems


Supplies and accessories

All indexes reflect a historical base of 100 on Dec. 31, 1984, and trace stock market performance in relation to that base. The CW stock index represents the unweighted average performance of the six categories of computer industry stocks.

	3/19/86	3/26/86
Computer systems	118.8	**120.6**
Software and DP services	105.1	**105.0**
Peripherals and subsystems	119.0	**116.5**
Supplies and accessories	153.4	**152.3**
Semiconductors	109.6	**104.4**
Leasing companies	104.1	**103.8**
CW stock index	118.8	**116.8**
Standard and Poor's 500 stock index	140.9	**141.9**


Semiconductors


Leasing companies

Computerworld stock trading summary

CLOSING PRICES WEDNESDAY, MARCH 26, 1986

COMPUTER SYSTEMS

EXCH		52 WEEK RANGE (1)	PRICE CLOSE MAR 26 1986	WEEK NET CHNGE	WEEK PCT CHNGE
O	ALPHA MICROSYSTEMS	5- 9	6 1/8	+1/4	+4.2
O	ALTOS COMPUTER SYST	9- 17	16	-1/4	-1.5
A	AMDAHL CORP	10 18	14 5/8	-3/8	-2.5
O	APOLLO COMPUTER	9- 31	15	-1/2	-3.2
O	APPLE COMPUTER INC	14- 31	28 1/4	+1 3/4	+6.6
N	AT&T	19 28	22 1/4	-1/2	-2.1
N	BURROUGHS CORP	52- 71	65 3/4	+1 3/8	+2.1
O	COMPAQ COMPUTER CP	5- 16	14 3/8	-7/8	-5.7
O	COMPUTER AUTOMATION	1- 9	2	-1/4	-11.1
A	COMPUTER CONSOLES	5- 14	7 3/4	-3/4	-8.8
N	CONTROL DATA CORP	15- 39	24	-1 3/4	6.7
O	CONVERGENT TECHNOL	5- 13	9 1/2	-2	-17.3
O	CPT CORP	5- 8	5 7/8	+1/8	+2.1
N	CRAY RESEARCH INC	25- 74	68 7/8	-1 7/8	-2.6
O	DAISY SYSTEMS CORP	11 38	11 3/4	0	0.0
N	DATA GENERAL CORP	31- 76	38 1/2	-1 3/8	-3.4
N	DATAPOINT CORP	5- 22	5 1/2	0	0.0
N	DIGITAL EQUIPMENT	85- 167	154 3/8	-6 1/2	-4.0
A	EECO INC	13- 16	16 1/4	+1	+6.5
N	ELECTRONIC ASSOC.	3- 6	6 1/4	-1/8	-1.9
N	FLOATING POINT SYST	18- 37	35	+1	+2.9
N	FOXBORO	22- 31	26 3/4	-1/2	-1.8
N	GOULD INC	20- 38	26 5/8	-1 1/4	-4.4
N	HARRIS CORP	22- 35	28 1/2	-5/8	-2.1
N	HEWLETT PACKARD CO	29 45	43 1/8	0	0.0
N	HONEYWELL INC	54- 87	71	-5	-6.5
N	IBM	117 158	147 5/8	-4	-2.6
O	IPL SYSTEMS INC	1- 4	2 3/8	0	0.0
N	ITT CORP	28 47	47 1/4	+1 1/4	+2.7
N	M A COM INC	13 24	16 3/4	-3/4	-4.2
N	MANAGEMENT ASSIST	2- 28	2 1/8	0	0.0
N	MATSUSHITA ELEC(ADR)	49- 75	74 5/8	+7/8	+1.1
O	MENTOR GRAPHICS	13 30	15	+1/2	+3.4
N	MODULAR COMPUTER SYS	6- 8	7 3/8	-1/8	-1.6
N	MOHAWK DATA SCI	1- 13	3	+1/8	+4.3
N	NBI INC	11 20	13 1/8	-1	-7.0
N	NCR	25- 46	41 7/8	-1/2	-1.1
N	PERKIN ELMER	22 36	31 1/8	-1 1/2	-4.5
N	PRIME COMPUTER INC	15 27	22 5/8	-2 1/8	-8.5
N	SPERRY CORP	39 59	50 3/4	-3/8	-0.7
O	STRATUS COMPUTER INC	9- 25	18 3/4	0	0.0
O	TANDEM COMPUTERS INC	13- 29	23 1/8	-1 1/2	-6.0
N	TANDY CORP	24 44	41 1/8	-2 5/8	-6.0
O	TELEVIDEO SYSTEMS	2- 4	3 5/8	+1/8	+3.5
O	TELXON CORP	10 28	26 1/2	1 3/4	-6.1
N	TEXAS INSTRUMENTS	86- 132	121	-6 5/8	-5.1
A	ULTIMATE CORP	8- 32	29 1/4	+2	+7.3
O	VECTOR GRAPHICS INC	1 1	1/8	0	0.0
A	WANG LABS 'B'	15- 29	19 3/8	-7/8	-4.3
A	WANG LABS 'C'	15 29	19 3/8	-1 1/8	-5.4
N	XEROX CORP	37- 72	67 7/8	-1/2	-0.7

SUPPLIES & ACCESSORIES

EXCH		52 WEEK RANGE (1)	PRICE CLOSE MAR 26 1986	WEEK NET CHNGE	WEEK PCT CHNGE
N	AMERICAN BUS PRODS	21 35	32 5/8	+3/8	+1.1
N	BARRY WRIGHT	17- 29	22 1/4	-1 1/8	-4.8
A	DUPLEX PRODUCTS INC	13- 22	21 1/8	+3/8	+1.8
N	ENNIS BUS. FORMS	14- 28	26 1/8	-1 5/8	-5.8
N	3M COMPANY	74 107	106 7/8	+2 7/8	+2.7
N	MOORE CORP LTD	15- 25	24 3/4	-1/2	-1.9
O	STANDARD REGISTER	22- 40	39 3/4	+1/4	+0.6
N	WALLACE COMP SERVICE	30- 46	45 5/8	+1/2	+1.1

EXCH: N NEW YORK, A AMERICAN, P PACIFIC; B BOSTON,
L NATIONAL, M MIDWEST; O OVER-THE-COUNTER

O.T.C. PRICES ARE BID PRICES AS OF 3 P.M. OR LAST BID
(1) TO NEAREST DOLLAR

SOFTWARE & DP SERVICES

EXCH		52 WEEK RANGE (1)	PRICE CLOSE MAR 26 1986	WEEK NET CHNGE	WEEK PCT CHNGE
O	ADVANCED COMP TECH	2 5	4 5/8	+1/4	+5.7
N	ADVANCED SYSTEMS INC	9 20	17 3/4	-1 1/2	-7.7
N	AGS COMPUTERS INC	10- 25	22 1/2	-1/2	-2.1
O	AMERICAN SOFTWARE	9- 15	10 5/8	+3/8	+3.6
N	ANACOMP INC	2 5	4 1/2	-1/4	-5.2
O	ANALYSTS INTL CORP	5 11	7	+1/4	+3.7
O	ASHTON TATE	6- 23	20 7/8	-2 3/8	-10.2
O	ASK COMPUTER SYSTEMS	7- 25	12 1/4	+1 1/4	+11.3
P	ASTRADYNE COMP IND	1- 3	2	-1/8	-5.8
N	AUTOMATIC DATA PROC	35- 70	68 5/8	+2 5/8	+3.9
O	COMPUTER NETWORK	5- 9	5 5/8	+3/8	+7.1
O	COMPUTER ASSOC INT'L	18- 37	35	1 3/4	-4.7
O	COMPUTER HORIZONS	5 11	12 1/8	+3/8	+3.1
N	COMPUTER SCIENCES	13- 36	34 3/4	-1/4	-0.7
O	COMPUTER TASK GROUP	10- 26	23 1/2	-2	-7.8
O	COMPUTER USAGE	1 3	2	0	0.0
O	COMPUTONE SYSTEMS	4 11	3 5/8	-1/8	-3.3
O	COMSERV CORP	1- 6	4 1/2	0	0.0
O	COMSHARE	7- 12	10 5/8	-1/4	-2.2
N	CULLINET SOFTWARE	12- 33	11 3/4	-1 3/8	-10.4
O	CYCARE SYSTEMS INC	19- 27	26	0	0.0
O	HOGAN SYSTEM INC	4 12	7 1/4	+3/8	+5.4
N	GENERAL ELECTRIC CO	56- 78	78 3/8	+5/8	+0.8
N	GENL MOTORS E (EDS)	20- 47	44 5/8	-1 7/8	4.0
N	GTE CORP	38- 52	52	0	0.0
O	INFORMATION SCIENCE	1- 5	2 3/4	0	0.0
O	INFOTRON SYSTEMS CP	13 24	16 3/4	-1/2	-2.8
O	KEANE ASSOCIATES	10- 20	13 1/2	0	0.0
N	LOGICON	25- 43	37 3/8	+5/8	+1.7
O	LOTUS DEVELOPMENT CP	15 34	28 1/2	-1/4	-0.8
O	MCI COMMUNICATIONS	7- 13	11 3/4	-5/8	-5.0
O	MNGT SCI AMER INC	7- 16	12 3/4	-1 3/4	-12.0
O	MATHEMATICAL APP GRP	1- 8	1 7/8	0	0.0
O	MICOM SYSTEMS INC	12- 35	15 3/4	-1/2	-3.0
O	MICROPRO INT'L CP	2- 4	3	0	0.0
O	NATIONAL DATA CORP	8 19	19 1/8	0	0.0
O	ON LINE SOFTWARE INT	4- 12	12 1/4	+1 1/4	+11.3
N	PANSOPHIC SYSTEMS	14 30	29 5/8	+7/8	+3.0
N	PLANNING RESEARCH	11 23	22 7/8	+7/8	+3.9
O	POLICY MGMT SYSTS CP	16- 35	18 1/2	+1 1/4	+7.2
O	PROGRAMMING & SYS	4- 9	7 3/4	0	0.0
O	REYNOLDS & REYNOLD	31- 65	61 3/4	-3 1/4	-5.0
O	SEI CORP	13- 27	22 3/4	-3/4	-3.1
O	SHARED MEDICAL SYST	26- 38	36	-2 1/8	-5.5
O	SCIENTIFIC COMPUTERS	5- 8	4 5/8	+1/8	+2.7
*O	SOFTWARE AG	12- 22	18 1/2	-3/4	-3.8
N	URS CORP	10- 17	17	+1/4	+1.4
N	UCCEL	11 18	17 7/8	+3/4	+4.3
O	VM SOFTWARE	17- 24	19	-1 1/4	-6.1

SEMICONDUCTORS

EXCH		52 WEEK RANGE (1)	PRICE CLOSE MAR 26 1986	WEEK NET CHNGE	WEEK PCT CHNGE
N	ADVANCED MICRO DEV	22- 36	29 1/2	-1 1/8	-3.6
O	ADV D SEMICONDUCTOR	7- 23	12 1/2	-1/4	-1.9
N	ANALOG DEVICES INC	18 31	26 7/8	-2 5/8	-8.8
O	ANALOGIC CORP	11- 16	13 1/2	0	0.0
N	APPLIED MAGNETICS CP	9 19	15 3/4	-5/8	-3.8
O	AVANTEK	18 26	20 1/8	-1 1/8	-5.2
O	HADCO CORP	3 7	4 1/2	0	0.0
O	INTEL CORP	21- 33	26 3/4	-1/4	-0.9
O	MICRO MASK INC	6- 12	5 5/8	-3/4	11.7
N	MOTOROLA INC	29 45	43 5/8	1 1/8	-2.5
N	NAT'L SEMICONDUCTOR	10- 15	13 1/8	-1 1/4	-8.6
N	TERADYNE	17- 33	22 5/8	-2 1/8	-8.5

PERIPHERALS & SUBSYSTEMS

EXCH		52-WEEK RANGE (1)	PRICE CLOSE MAR 26 1986	WEEK NET CHNGE	WEEK PCT CHNGE
P	AM INTERNATIONAL	3- 8	6 3/4	-3/4	-10.0
A	ANDERSON JACOBSON	2- 5	2 3/8	+1/4	+11.7
O	AST RESEARCH INC	7- 33	18 1/8	-2	-9.9
O	AUTO TROL TECHNOLOGY	3- 13	5 1/8	-5/8	-10.8
O	AVANT-GARDE COMPUTNG	3- 21	4 1/2	-1/4	-5.2
O	BANCTEC INC	6- 12	10 1/8	-1	-8.9
O	BEEHIVE INT'L	1- 2	1/8	0	0.0
N	BOLT,BERANEK & NEW	20 39	39 3/8	+1	+2.6
O	CAMBEX CORP	1- 3	1 1/4	0	0.0
N	CENTRONICS DATA COMP	3- 11	5 3/4	+1/8	+2.2
A	CETEC CORP	6- 9	8 3/8	0	0.0
A	COGNITRONICS	4- 7	3 7/8	-3/8	-8.8
N	COMPUGRAPHIC CORP	23- 36	24 3/4	0	0.0
O	COMPUTER TRANSCEIVER	0- 1	5/8	0	0.0
N	COMPUTERVISION CORP	9- 44	16	-3/4	-4.4
N	CONRAC CORP	12- 18	17	+5/8	+3.8
A	DATAPRODUCTS CORP	11- 20	14 5/8	-7/8	-5.6
A	DATARAM CORP	4- 14	13	+1/4	+1.9
O	DATA SWITCH CORP	4 9	5 1/8	-3/8	6.8
O	DATUM INC	5 9	5 1/2	0	0.0
O	DECISION DATA COMPUT	10- 20	11 1/8	5/8	-5.3
O	ENDATA, INC	2- 8	6 1/2	1/8	-1.8
O	EVANS & SUTHERLAND	12 24	21 3/8	+1/8	+0.5
O	GANDALF TECHNOLOGIES	5- 13	6 3/8	+1/4	+4.0
N	GEN'L DATA COMM IND	8 21	11	1/4	2.2
N	HAZELTINE CORP	20 30	22 1/4	+5/8	+2.8
O	ICOT CORP	3- 12	11 3/8	5/8	5.2
O	INFORMATION INTL INC	10 17	13	0	0.0
O	INTECOM INC	4 11	3 1/2	-3/8	-9.6
A	LUNDY ELECTRONICS	10- 15	14 1/4	0	0.0
O	MEGADATA CORP	3- 8	3 5/8	0	0.0
A	MSI DATA CORP	7- 13	12 1/8	0	0.0
N	NASHUA CORP	24 42	40	-1 3/4	-4.1
O	NETWORK SYSTEMS CORP	11 27	12	+5/8	+5.4
N	NO AMERICAN PHILIPS	32 45	45 3/8	+1 3/8	+3.1
N	NORTHERN TELECOM LTD	26 41	30 3/8	+1/2	+1.6
O	OMEX	1 3	3/8	0	0.0
N	PARADYNE CORP	6 18	8 1/2	+1/8	+1.4
A	PENRIL CORP	7 14	7 5/8	1/4	3.1
N	PLESSEY CO (ADR)	19 32	30 1/2	1 1/8	3.5
O	PRINTRONIX INC	9- 18	14 1/2	+1 1/4	+9.4
O	QMS INC	6- 16	11 3/8	+1/4	+2.2
O	RAMTEK CORP	2 7	4	+3/4	+23.0
N	RECOGNITION EQUIP	9 17	13 5/8	1/2	3.5
N	SANDERS ASSOCIATES	30- 44	42 1/4	+1 5/8	+4.0
O	SCAN TRON CORP	9 22	21 1/2	+1 1/4	+6.1
N	SCIENTIFIC ATLANTA	10 15	10 3/4	3 1/2	24.5
O	SEAGATE TECHNOLOGY	5- 11	10 3/8	+1/4	+2.4
N	STORAGE TECHNOLOGY	1 5	4 1/8	1/4	-5.7
O	SYKES DATATRONICS	0 2	3/8		6.6
A	T BAR INC	5 9	6 1/8	1/4	3.9
A	TAB PRODUCTS CO	14 22	21 3/8	1/8	0.5
O	TANDON CORP	3 9	5	1/8	-2.4
A	TEC INC	6 13	6 1/8	1/2	7.5
N	TEKTRONIX INC	47- 68	55 3/4	4 1/4	7.0
N	TELEX	34 68	56 7/8	6 1/8	9.7
O	TESDATA SYSTEMS CP	0 3	1	0	0.0
N	TIMEPLEX INC	15 23	15 1/2	0	0.0
N	TITAN CORP	4 11	9 3/4	1	9.3
O	VISUAL TECHNOLOGY	1- 3	5/8	1/8	21.3

LEASING COMPANIES

EXCH		52-WEEK RANGE (1)	PRICE CLOSE MAR 26 1986	WEEK NET CHNGE	WEEK PCT CHNGE
N	COMDISCO INC	7 22	22	+1 1/8	+5.3
N	CONTINENTAL INFO SYS	5- 20	17 1/8	-2 3/8	12.1
O	FINALCO GROUP INC	4 5	4 5/8	+1/8	+2.7
O	PHOENIX AMERICAN INC	2- 4	3 7/8	0	0.0
O	SELECTERM INC	6- 12	6	3/4	11.1
N	U.S. LEASING	32 45	44 3/4	+1 1/4	+2.8

Source: Trade Quotes, Inc.

COMPUTER INDUSTRY

INSIDE

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The computer industry favors the latest Senate tax bill, which includes a 25% R&D tax credit/**90**

Lotus Chairman Mitch Kapor steps out of the software firm's day-to-day operation/**92**

IBM sues an equipment broker for using "1-800-IBM-USED" to advertise its toll-free phone number/**108**

IBM's smooth succession

Akers' chairmanship won't disturb the Big Blue waters

By Alan Alper
and Clinton Wilder

ARMONK, N.Y. — The ascension of IBM President and Chief Executive Officer John F. Akers to chairman following John R. Opel's retirement on June 1 will have minimal impact on the industry leader's strategic direction or its day-to-day operations, analysts and observers said after Opel's retirement announcement last week.

IBM Chairman John R. Opel

"It is an orderly succession," noted Stephen Dube, an analyst with Shearson Lehman Brothers, Inc. in New York. "IBM management shifts are usually of the 'don't make waves' variety."

As chairman, Akers adds long-term planning to his current roster of responsibilities, which primarily consist of day-to-day management of the $50 billion company, an IBM spokeswoman said. Analysts said they expect little change in the firm's strategic direction since many of the major corporate decisions emanate from already-established management committees.

Opel, 61, will remain on the board and assume chairmanship of the powerful Executive Committee from retired IBM Chairman Frank T. Cary on April 28, the date of IBM's annual shareholders' meeting in Houston.

"No one should think that Opel will clean out his desk on June 1, drive away and never see Blue again," said veteran IBM observer Bob Djurdjevic of Annex Research in Phoenix. "Retiring IBM executives keep their finger in the pie, then are phased out gradually. Even Cary has continued to be active at the board level."

Opel, a 37-year IBM veteran, took over

See **AKERS** page 108

INSTANT ANALYSIS

"We're going to get back to business and forget about investment bankers."

— Paul C. Ely Jr., president and CEO, Convergent Technologies, Inc., after the collapse of his firm's merger with 3Com Corp.

Rising stock market tide fails to lift the computer industry boat

By Alan Alper

Despite Wall Street's recent robust enthusiasm toward publicly traded stocks, most computer industry issues, to few analysts' surprise, are not participating in the raging bull market.

Although the Standard & Poor's 500 index is up some 40% over the last year, a thorough sampling of publicly traded computer stocks shows that the shares of most corporations are only slightly closer to their 52-week high than they are to their one-year low. Firms that are indicative of that trend include Apollo Computer, Inc., which has been trading in the $16-per-share range; Data General Corp., which has hovered in the $37-per-share area; and Wang Laboratories, Inc., which remains at approximately $22 per share.

"It's a reflection of current business conditions," says William Easterbrook, an analyst with Kidder Peabody & Co. in San Francisco. "In the end-user portion of the business, demand for computers varies from poor to awful, and there is no significant change foreseen."

Indeed, Easterbrook points out, that order weakness is an industrywide phenomenon, dampening investor spirits as well as sales and earnings projections at many computer concerns.

IBM, over the last couple of quarters, has admonished the financial community to expect minimal sales and earnings increases over last year because of continu-

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INDUSTRY INSIGHT
Clinton Wilder

Chilly effect of insurance crisis

A big chill is spreading through the boardrooms of corporate America with the potential to threaten the rapid pace of mergers and acquisitions in the computer industry. The phenomenon goes by many names, but for simplicity we will call it the "directors' liability insurance crisis."

As *Time* magazine noted in a recent cover story, liability coverage on everything from tobacco products to ski lifts to playground swing sets is fast becoming either prohibitively expensive or virtually impossible to obtain. The corporate boardroom is feeling the same effect on the cost of its protection against shareholder lawsuits for allegedly imprudent business decisions. By all estimates, the number of such suits, like just about every other kind of suit, has skyrocketed in the last decade.

The implications for board members considering an acquisition move or an acquisitor's offer are obvious — particularly if theirs is a smaller company that recently decided to risk going without directors' liability because of spiraling premiums. It all adds up to the strongest barrier against decisive corporate action: fear.

"Anything that makes boards more fearful is probably not healthy," says Bernard Goldstein, a partner in Fort Lee, N.J.-based Broadview Associates, one of the software and services industry's premier merger and acquisition orchestrators. "Too many are already

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Wilder is Computerworld's *senior editor, computer industry.*

Merger of Convergent, 3Com suffers 11th hour collapse

Investment bankers reassess equitability

By Maura McEnaney

SAN JOSE, Calif. — The expected merger between network products vendor 3Com Corp. and systems manufacturer Convergent Technologies, Inc. fell apart at the 11th hour last week after investment bankers told 3Com board members that the merger plan was not in the best interest of 3Com shareholders.

Last Tuesday, just two days before Convergent shareholders were scheduled to meet and approve the merger, San Francisco-based investment bankers Robertson, Colman & Stephens withdrew their previous opinion that the merger plan to exchange each outstanding share of 3Com stock for one share of Convergent stock was fair to 3Com shareholders. The favorable fairness opinion was a condition of the merger.

The revised opinion rejected only the previously negotiated terms of the $133.6 million merger, not the concept of a 3Com-Convergent partnership. But immediate attempts to renegotiate the merger agreement failed, and the merger was called off on Wednesday. "I'm sad and disappointed that the merger didn't work out," 3Com President L. William Krause told *Computerworld*.

Convergent President and Chief Executive Officer Paul C. Ely Jr. was noticeably upset about the last-minute change of opinion. "We had three months to put this deal together," Ely said, "then a day and a half to work it out? Be serious. We felt we had a bargain that was fair to both companies. The disappointing part was the lateness and the shotgun approach of the investment bankers."

Although officials of Robertson Colman refused comment, the revised opinion apparently resulted from the gloomy short-term financial outlook that Convergent recently presented to security analysts. Two weeks ago, Convergent projected first-quarter revenue of between $70 to $80 million and earnings of between zero and 5 cents a share, compared with earlier projections of $90 million in revenue and earnings of between 5 to 10 cents a share.

At the same time, 3Com's already strong business outlook became even brighter, and the investment bankers essentially advised that one Convergent share was no longer equal in value to one 3Com share. For the third quarter ended Feb. 28, 3Com recorded $16.9 million in sales and $1.8 millon in profits, with the revenue representing a 107% increase over year-ago totals.

"There was a strengthening in 3Com's order situation of late and the third-quarter figures caused Robertson Colman to reevaluate the situation," Krause said. He cited a resurgent interest in Ethernet, increased demand for multiuser applications and 3Com's shipment of the 3+ network operating system as factors bolstering recent sales.

Indications of problems with the merger began to surface last week, when attorneys instructed 3Com and Convergent executives to cancel press interviews slated to take place before the shareholders' meeting.

Convergent founder and former Chairman Allen Michels was surprised when *Computerworld* told him of the failed merger. "I regret the decision taken by the 3Com board," said Michels, who left Convergent

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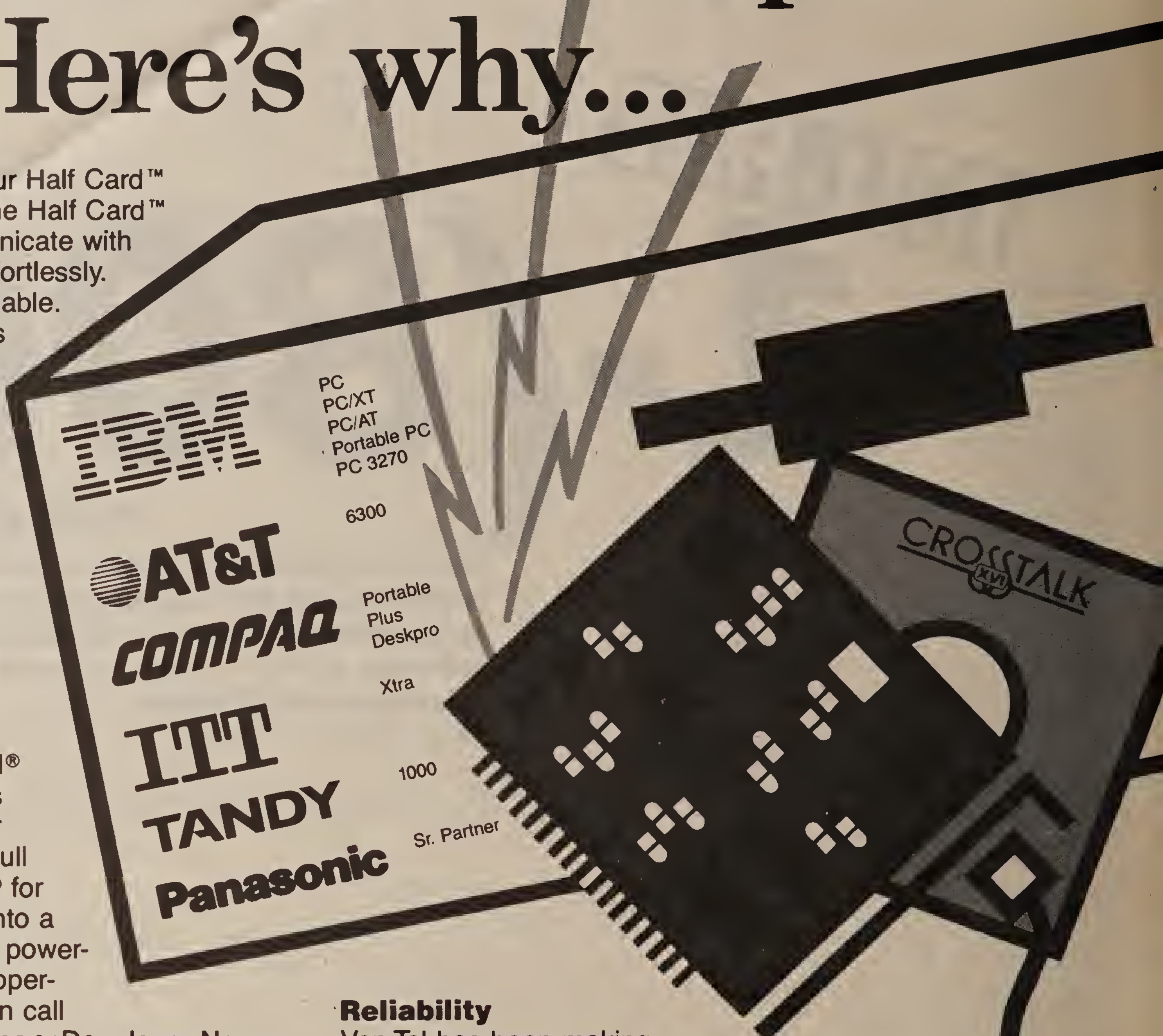

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